EVALUATION OF CLINICAL EFFECTIVENESS OF AUTOGENOUS DENTIN GRAFT IN PERIODONTAL INTRABONY DEFECT A CLINICAL AND RADIOLOGICAL STUDY

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MASTER OF DENTAL SURGERY

BRANCH – II

PERIODONTICS

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

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ABSTRACT

Background: Periodontal therapy aims to prevent periodontal tissue destruction while achieving regeneration of lost and damaged tissues. Autografts are considered as gold standard in concept of regeneration . The extracted tooth which is considered as clinical waste, can be prepared into an autograft for immediate grafting in intrabony defects .

Autogenous dentin graft (ADG) is osteogenic, osteoinductive and osteoconductive and being autograft it has antigenic resistance . This Autograft contains growth factors , BMP, HA and helps in bone neoformation. The purpose of this study was to evaluate the clinical and radiographic effectiveness of autogenous dentin graft in the management of intrabony defects.

Aim: The aim of this study was to evaluate the clinical effectiveness of autogenous dentin graft in the treatment of intrabony defects.

Methods: A total of 10 intrabony defects were selected randomly for the purpose of the study. After the Phase-I therapy, the defects were treated with autogenous dentin graft . Clinical parameters such as plaque index (PI), gingival bleeding index (GBI), probing pocket depth (PPD), and clinical attachment level (CAL) were recorded at baseline and at 6 months post-operatively. Radiographic analysis including CBCT was performed at baseline, 3 months and 6 months post operatively.

Results: Significant reduction in the mean pocket depth and gain in attachment level was observed in as compared to baseline, the reduction in defect depth was significant (p=0.001) at the end of 6 months. Greater percentage of bone fill at 3 month 39.09± 14.62 and at 6 month 62.35 ± 15.59 were observed. Bone mineral density showed good improvement from at baseline was 27.10± 42.52, at 3 months was 334.30 ± 97.61and at 6 months was 727.40 ± 154.99 and which was statistically significant (p = 0.000) .

Conclusion: Within the limits of present study it can be concluded that Autogenous dentin graft which is prepared from the extracted teeth which is usually have proved to give promising regenerative results when used in periodontal bone defects. Successful regenerative results have been demonstrated in clinical and radiological parameters including CBCT. Thus in future, clinical trials with larger sample size may be employed to further explore the potential benefits of AUTOGENOUS DENTIN GRAFT as a grafting material in periodontal regeneration.

Keywords: autogenous dentin graft, autograft, Intrabony defect, Periodontal Regeneration.

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LIST OF ABBREVATIONS

(ADDM)	AUTOGENOUS DEMINERALIZED DENTIN MATRIX SLICES
(AC)	ALVEOLAR BONE CREST
(ATG)	AUTOGENOUS TOOTH GRAFT
β TCP	BETA TRICALCIUM PHOSPHATE
(BOP)	BLEEDING ON PROBING
(BF)	BONE FILL
(BCC)	BONE CREST CHANGE
(BD)	THE BOTTOM OF THE DEFECT
(BMP)	BONE MORPHOGENIC PROTEIN
(BSP)	BONE SIALOPROTEIN
(CF)	THE CORRECTION FACTOR
(CAL)	CLINICAL ATTACHMENT LEVEL
(CBCT)	CONE BEAM COMPUTED TOMOGRAPHY
(CEJ)	CEMENTO ENAMEL JUNCTION
(DD)	DEFECT DEPTH
(DR)	DEFECT RESOLUTION
(DSPP)	DENTIN SIALOPHOSPHOPROTEIN
(DMP1)	DENTIN MATRIX PROTEIN 1
(DDM)	DIMENERALIZED DENTIN MATRIX
(DBM)	DIMENERALIZED BONE MATRIX
(EMD)	ENAMEL MATRIX DERIVATIVE
(EGF)	EPIDERMAL GROWTH FAC- TOR
(FGF)	FIBROBLAST GROWTH FACTOR
(GTR)	GUIDED TISSUE REGENERATION
(IGF-I)	INSULIN GROWTH FACTOR-I
(IOPA)	INTRA ORAL PERIODICAL RADIOGRAPH
(HAp)family	HYDROXYAPATITE
(NCPs)	NON-COLLAGENOUS PROTEINS
(OPG)	ORTHO PANTOMO GRAM
(OPN)	OSTEOPONTIN
(PI)	PLAQUE INDEX

(PD)	PROBING DEPTH
(PPD)	PROBING POCKET DEPTH
(PDL)	PERIODONTAL LIGAMENT
(PDGF)	PLATELET-DERIVED GROWTH FACTOR
(RA)	ROOT APEX
(SIBLING)	SMALL INTEGRIN-BINDING LIGAND, N-LINKED GLYCOPROTEIN
(SEM)	SCANNING ELECTRON MICROSCOPY
(TGF-β)	TRANSFORMING GROWTH FACTOR-BETA
(UDS-J)	ULTRASONIC SCALER

INTRODUCTION

Periodontitis is an multifactorial disease and is characterized by the destruction of supporting alveolar bone and connective tissue structures due to change in host defence mechanism following an inflammatory host response secondary to infection by periodontal bacteria [1, 2.] Severe periodontitis, which may result in tooth loss, is found in 5–20% of most adult populations worldwide [3–5].

Regeneration is the process which involves the restoration, reconstitution and reconstruction of the tissue lost due to trauma or disease . The periodontal regeneration aims the restoration of supporting structures of the tooth which has been lost due to trauma from dentition or periodontal diseases. The periodontal regeneration involves the formation of new periodontal ligament, new alveolar bone, and new attachment apparatus

Children and adolescents can have any of the several forms of periodontitis such as aggressive periodontitis chronic periodontitis, and periodontitis as a manifestation of systemic diseases [6-8]

One of the biggest challenges remaining in dentistry is to predictably regenerate the alveolar bone lost due to perioodontitis. Periodontal regeneration is a multifactorial process and it requires an orchestrated sequence of biological events which includes cell adhesion, migration, multiplication and differentiation involving recruitment of locally derived progenitor cells to the site. Regeneration of the supporting structures of teeth involves the use of variety of materials of natural and synthetic origin .Great strides are being made to achieve this goal using the method of bone grafting and other regenerative procedures .An ideal construct for periodontal wound healing /regeneration would encompass a combination of biologics with an

ease-of-use, mouldable, space providing, biocompatible, bioadhesive, porous and biodegradable matrix for local applications.

Autogenous bone grafts obtained from same individual has always been considered the gold standard because of its high osteogenic potential and virtually has nil immunological response .In addition to obtaining bone from the surgical site, bone from other sites in the oral cavity has been used successfully for periodontal osseous grafts. Donor sites for this bone include healing bony wounds ,edentulous ridges, tori and the maxillary tuberosity and recently the regenerative capacity of Human dentin autograft as a first clinical case while human bone autograft was done in 1820. There was a long time lag between the autografts of dentin and bone. [8.] In recent times the tooth derived graft material is becoming a viable alternate for the bone grafts .

The repair of bone defects resulting from trauma, infections, neoplasias or developmental abnormalities represents a challenge for maxillo mandibular complex surgeries.Several researches have presented some materials that have osteopromotive potential for osteogenesis. The dentin matrix used as implant biomaterial has osteogenic and chemotactic potential. Some authors have reported that autogenous demineralised dentin matrix slices (ADDM) stimulated bone neo formation.[9 ,10] The autogenous dentin graft is osteoinductive, osteoconductive and osteogenetic in nature . The dentin graft gives good clinical and radiological results when used in socket preservation , ridge augmentation procedures , in local defect for regenerative purpose.

AIMS AND OBJECTIVES

AIM :

To evaluate the clinical and radiological effectiveness of autogenous dentin graft in the management of periodontal intrabony defects.

OBJECTIVES:

To compare the

- clinical parameters bleeding on probing, periodontal pocket depth before and after the treatment .
- Radiographic assessment of intrabony defect before and after the treatment (IOPA)& (CBCT).

REVIEW OF LITERATURE

1. PERIODONTAL REGENERATION

Regeneration is defined as the reproduction or reconstruction of the lost or injured part with form and function of lost structures. Periodontal regeneration is defined histologically as regeneration of the tooth's supporting tissues, including alveolar bone, cementum and periodontal ligament over a diseased root surface[11] Periodontal regeneration is unique because it involves soft (gingival and periodontal ligament) and mineralized (bone and cementum) connective tissues.

Melcher et al [12] in 1976 postulated the type-specific cell repopulation theory, which was further established by **Gotlow et al** [13] in 1986. This theory states that, four different periodontal connective tissues compete for the root surface during healing (gingiva, PDL, cementum and alveolar bone). Which phenotype succeeds in repopulating the root surface determines the specific type of repair or regeneration.

Trombelli et al [14] in 2002 in their systematic reviews compared the results of open flap debridement alone and in combination with graft materials and concluded that implantation of graft materials provided favourable results such as gain in clinical attachment levels, reduction in pocket probing depths and gain in defect fills.

Needleman [15] *in* 2002 and **Giannobile & Somerman** [16] in 2003, in their respective systematic reviews on application of guided tissue regeneration reported significant increase in clinical attachment levels (CAL); however the magnitude of the observed additional benefits were modest.

Wang et al [17] in 2006 reported that various factors which determine the predictability of bone regeneration include primary wound closure, blood supply, defect architecture, space maintenance and wound stability. These factors play a vital

role in deciding the amount and extent of achievable regeneration via various grafting modalities.

Close proximity between the defect and the periodontal mesenchymal cell sources allow adequate migration & differentiation of these cells into the defects. Predictable outcomes are possible not only through the prevention of migration of undesired cells but also through stimulation of the migration, proliferation and differentiation of mesenchymal, endothelial and periodontal ligament cells [18]

Hector f rios *in 2015* [19] in a study concluded that periodontal regenerative therapy should be an individualised periodontal regeneration therapy .

2. BONE GRAFTS

Over the years, various bone grafts have been widely used in the management of periodontal osseous defects and are still the most preferred regenerative technique.

Broadly, bone grafts are classified as autografts, allografts, xenografts and alloplasts .The use of autogenous grafts and decalcified freeze-dried allografts has shown significant clinical improvements, and histological studies have reported regeneration of the attachment apparatus. But the lack of adequate donor material and the fear of the remote chance of disease transmission have limited the use of autogenous grafts and allografts on a routine basis. This prompted the development of alloplasts or synthetic bone substitutes for periodontal applications.

Lee M.B et al in 1997 [20] stated that for a bone graft material, osteoinduction, osteostimulation and osteoconduction are three levels of biological response with osteoinduction being the highest level. The osteoinductive graft materials such as

bone morphogenetic proteins (BMPs) are able to induce stem cell and promote new bone formation in the bony defect. Osteostimulation is an intermediate level.

The osteostimulative graft material can enhance the production of growth factors and promote the proliferation and differentiation of bone cells, which stimulate new bone formation. Osteoconductive graft materials can serve as a scaffold and the native bone grows along their surface from the edge to the centre of the defect.

Froum et al [21] in 1976 clinically evaluated and compared responses of human periodontal defects following open debridement with and without the subsequent implantation of an osseous coagulum bone blend graft. They reported greater levels of osseous regeneration with the autogenous graft procedures than following open debridement alone.

Petite et al [22] in 2000 concluded that autogenous bone grafts are the preferred choice for any regenerative procedure.However patient morbidity, limited supply of suitable bone, risk of infection, nerve damage and haemorrhage remain the factors of concern.

Reynolds et al [23] in 2003 in their systematic review on bone replacement grafts concluded that bone grafts increase bone level, reduce crestal bone loss, increase clinical attachment level and reduce probing depth when compared to open flap debridement. Also, there was no significant difference in clinical outcome measures between particulate bone allografts and bovine derived xenografts.

Reynolds et al *in 2003* [23] stated that Bone Grafts should Increase the bone level ,Decrease crestal boneloss, Increase the CAL gain, decrease probing depth and Support the formation of new attachment apparatus.

Sculean A et al in 2008 [24] In a systematic review found that the combination of barrier membranes With graft materials may result in histological evidence of periodontal regeneration, predominantly bone repair.

Young-Kyun kim et al [25] in 2012 in their study concluded that autogenous tooth bone graft material is safe , having excellent bone healing property, it is developed as ideal scaffold for stem cells and growth factors.

Ivanovic A et al in 2014 [26] in a systemic review , combination therapy of grafts that is bone graft along with GTR membrane gives better regeneration and among various grafts , autografts gives good biologic responses .

Rajat gothi et al in 2015 [27] have done a comparative study between freeze dried bone allograft and decalcified freeze dried bone allograft in the treatment of intrabony defect, both treatment modalities gave improvement in probing depth, bone fill, CAL , and DFDBA showed no superior properties .

Salamanca et al in 2018 [28] in his study on bone regeneration by porcine bone substitute collagen composite showed superior results histologically and micro CT scan radiologically with respect to new bone formation , Porcine collagen graft showed bone viability and osteoblast like cell differentiation in vitro study and can be considered as bone substitute for regeneration.

3. AUTOGENOUS GRAFTS

Bone substitutes have been actively used in clinics to reconstruct bony defects. Among the graft materials available, the use of these materials depends on clinical applications, volume of deficiency, and evidence-based studies. Autogenous bone grafts are taken from one part of a patient’s body and transferred to another.

Several types of autogenous periodontal bone grafts include cortical bone chips, osseous coagulum, bone blend, extraction socket bone and extraoral cancellous bone with marrow.

Above all, autografts are known to be the gold standard because autografts can provide proteins, minerals, bone enhancing substances, viable bone cells and hence it is osteoinductive, osteoconductive, and osteogenitic in nature. Autogenous bone matrix has long been proven to be osteoinductive and rich in BMP.

Selcuc Yilmaz et al in 2010 [29] studied the Healing of two and three wall intrabony periodontal defects following treatment with an enamel matrix derivative combined with autogenous bone and concluded that combination of EMD1 +AB resulted in statistically significant higher soft and hard tissue improvements compared with treatment with EMD alone .

Tooth dentin and cementum contain number of BONE GROWTH FACTOS including type I collagen, bone morphogenic protein (BMP) which can perform the role of bone resorption and formation. Therefore bone graft material using tooth are considered to be potentially useful in clinics. Based on the potentials of osteoinduction, osteoconduction, and osteogenesis through growth factors in tooth and similar histogenesis between tooth and bone. A novel bone graft material can be developed utilizing the inorganic and organic components of an extracted tooth.

4. AUTOGENOUS DENTIN GRAFT

Kaboki et al in 1995 , in his study found *t*o obviate the need for harvesting of grafts and thus, to avoid morbidity resulting from it, the researches for bone substitutes or bone production via bio engineering have begun. **Murata et al** in 1999

In the field of regeneration ,stated that there is a medical need for biomaterials that both allow for bone formation and also gradually absorb as to be replaced by bone. Non resorbable materials are never replaced by bone and thus reveal chronic inflammation in tissue as foreign bodies.

4.1 INTRODUCTION

Donovan MG et al [30] in 1993 stated that Jaw bones, alveolar bone and teeth develop from cells of the neural crest ,and many proteins are common to bone, dentin, and cementum [30,31]. Dentin that comprise of more than 85% of tooth structure can serve as native bone grafting material.

Qin c et al *in 2002* [31] found that Teeth and bones share many similarities. The chemical compositions of teeth, especially dentin and bones, are very similar. Dentin consists of 65% inorganic substances, 35% organic substances, and water. Alveolar bone has 65% inorganic and 35% organic substances.

Schmidt-Schultz and Schultz et al [32] in 2005 found that intact growth factors are conserved even in the collagenous extracellular matrix of an ancient human bone and teeth. Tooth dentin and cementum contain number of bone growth factors including type I collagen, bone morphogenic protein (BMP) which can perform the role of bone resorption and formation .

Therefore bone graft material using tooth are considered to be potentially useful in clinics. Based on the potentials of osteoconduction, osteoinduction, and osteogenesis that occur through growth factors in tooth and similar histogenesis between tooth and bone, a novel bone graft material can be developed utilizing the inorganic and organic components of an extracted tooth. Osteopromotion is a concept

that has been incorporated into the bone repair process and it can be defined as the ability to induce bone formation using bone regeneration techniques. Its objective is to guide sufficient bone neoformation in order to close any bone defect in maxillomandibular processes.

This phenomenon is probably controlled by complex molecular interactions, cellular messages of short or long extension, affecting the speed and duration of the osteoblastic and osteoclastic activity, as well as proliferation, differentiation, and chemotaxis of special cells. [33,34,35,36] . Some authors have stated that cellular proliferation begins with local stimulating factors, that are bone morphogenetic proteins (BMP). [37,38,39,40] .

4.2 PREPARATION

The tooth have to be extracted . The tooth to be used for graft should be vital. It should not be root canal treated tooth. Non functional periodontally compromised or caries tooth or impacted tooth can be extracted. Later the extracted teeth were harvested, they were scaled and caries was removed using a round carbide bur. The enamel and cementum were removed. Pulp extirpation has to be done. The tooth has to be fragmented . The tooth fragment are powdered using a grinder having motor rating of 1500 Watts and speed of 700 rpm. The granules were repeatedly ground for 60 seconds. The crushed granules must be passed through two autoclaved stainless steel sieves in a sequential manner to obtain graft with particle size measuring between 300 and 500 μm. **41** .

The graft particles have been clinically sterilized by a procedure who's efficacy was established .**42** To achieve graft sterilization, the graft particles were

immersed in 1 N lactic acid for 15–20 minutes . This process partially decalcifies the autogenous dentin graft. Later the graft particles were washed using sterile normal saline thoroughly for 60 seconds to remove any residual traces of lactic acid [42]

4.3 COMPOSITION

Tooth dentin and cementum contain a number of bone growth factors including type I collagen and bone morphogenic protein. The main composition of dentin graft is protein that are collagenous and non collagenous in addition to lipids, ions, hydroxy apatites.

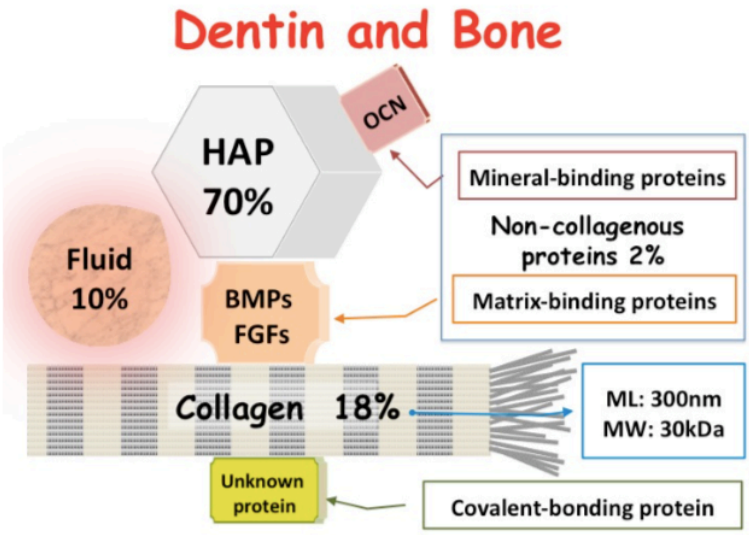


FIGURE 1 : COMPOSITION OF DENTIN AND BONE

THE NONCOLLAGENOUS PROTEINS,

- phosphophoryn,
- osteocalcin
- Osteonectin
- sialoprotein,

- glycoprotein,
- proteoglycan,
- Bone morphogenic protein
- Biopolymer,
- Lipid,
- Citrate, Lactate, Growth factors

They can perform the role of promoting bone resorption and bone formation. Therefore, bone graft materials using teeth are considered to be potentially useful in clinics . The non-collagenous proteins (NCPs) and hydroxyapatite (HAp) in weight volume .

The NCPs in dentin and bone are secreted into the ECM in the process of biomineralization. This category is termed the SIBLING (Small Integrin-Binding Ligand,N-linked Glycoprotein) family that includes dentin sialophosphoprotein (DSPP), dentin matrix protein 1 (DMP1), bone sialopro- tein (BSP) and osteopontin (OPN) .

4.4. GROWTH FACTORS

Finkelman et al in 1990 found that the DDM and DBM both are rich in type I collagen and few growth factors are present . In other words, DDM and DBM can be defined as acid-insoluble collagen binding BMPs , which are member of transforming growth factor-beta (TGF-β) super-family.

Both mature and immature types of BMP-2 were detected in human dentin and dental pulps . In addition to BMP, transforming growth factor-beta (TGF-beta),

Autogenous dentin graft is rich in fibroblast growth factor (FGF), Platelet-derived growth factor (PDGF) and Epidermal growth factor (EGF). DDM and DBM can be defined as acid-insoluble collagen binding bone morphogenetic proteins (BMPs), which are member of Transforming growth factor-beta (TGF-β) super-family. BMPs were discovered from bone matrix, and had bone-inducing property in non-skeletal site.

Animal dentin-derived BMPs were extracted with 4M guanidine HCl, and partially purified from rat, rabbit, and bovine In addition, the concentration of TGF-β, Insulin growth factor-I (IGF-I) and Insulin growth factor-II (IGF-II) were detected in human dentin (DDM). Briefly, the three growth factors were measured in the following concentration (ng/μg 4M guanidine hydrochloride-EDTA protein): TGF-β (0.017), IGF-I (0.06) and IGF-II (0.52). All 3 growth factors were present in concentrations lower than that in human bone .

Ito et al 2008 in a study found that , both mature and immature types of BMP-2 were detected in human dentin and dental pulps . BMP-2 strongly accelerated bone formation in the DDM carrier system. DDM never inhibited BMP-2 activity and revealed better release profile of BMP-2. These results indicate that human recycled DDM are unique, absorbable matrix with osteoinductivity and the DDM should be an effective graft material as a carrier of BMP-2 delivering and a scaffold for bone forming cells for bone engineering.

4.5.PROPERTIES

Yeomans JD, Urist MR [43] *et al* in 1967 found that Mineralized dentin particles have the advantage to maintain its mechanical stability, allowing early

loading after grafting in fresh sockets and bone defects. Moreover, in spite of delayed inductive properties , **Huggins C et al** in 1970 proved that the mineralized dentin is firmly integrated with newly formed bone, creating a solid site for anchorage of dental implants. [44]

Huggins et al. *1970* [44] found that the delayed inductive properties of the calcified dentin and bone may be related to the inhibition of BMPs-release by HAp crystals.

Huggins, CB. *Et al* in 1973 [45] defined Dimineralized dentin matrix (DDM) as an acid insoluble dentin collagen that is absorbable, but hard to digest in human body . DDM is acellular biomatrix with the micro-tube structure. DDM and DBM possess the ability to coagulate blood plasmas. The coagulation action of blood plasma by DDM should become advantageous for surgical operations.

Butler et al in 1977 .[46] stated that demineralised dentin has osteoinductive, osteoconductive, osteogenetic potential through its components and composition. Osteoinduction by tooth takes place with the help of BMPs. The BMP can promote the differentiation of undifferentiated mesenchymal stem cells into chondrocytes and osteogenic cells and results in new bone and cartilage formation.

Ritchie HH et al in 1998 [47]. Concluded in his study that the non collagenous proteins , osteocalcin, osteonectin, phosphoprotein, sialoprotein helps in calcification of bone.

Trisi P, Rao W *et al* in 2003 [41]found that ATG resorbs within 4–6 months after grafting.

Wang x et al 2008 [48] studied LIM mineralization protein 1 is a positive regulator of osteoblast differentiation, and maturation of bone. LMP 1 found

primarily in pre dentin, odontoblast. The osteoconduction property is by hydroxy apatite crystals and beta tricalcium phosphate. The β-TCP and the HA make thee dentin ash a biocompatible material.

Kim et al *in 2011* concluded that The remodelling process of the autogenous dentin graft with new bone formation continues up to 1–2 years.

Kim et al *in 2014* [49]concluded in a study autogenous tooth bone graft materials can be considered to have physicochemical characteristics similar to those of autogenous bones.

Murata et al *in 2*010 [50] reported the first clinical case of sinus augmentation using auto- dentin as a bone graft material. Interestingly, dentin and bone are almost similar with respect to composition. They consist of body fluid (10%), collagen (18%), noncollagenous proteins (2%), and hydroxyapatite (HA) (70%) in weight volume. According to Urist in 1965, demineralized dentin matrix and demineralized bone matrix contain mainly type-I collagen and growth factors such as bone morphogenetic proteins 2 and fibroblast growth factors. These bioactive molecules are thought to contribute to osteoinduction and osteoconductive property of human tooth as a graft material .

Kim et al *in 2011* [51] observed Mineral content wise, tooth consists of lowcrystalline HA and possibly other calcium phosphate minerals such as β-TCP, amorphous calcium phosphate, and octacalcium phosphate which is quite similar to human bone tissues.

Kim et al [52] in 2011., indicated that the content of autogenous tooth is quite comparable to that of autogenous cortical bone. Hence, properties like these might explain the better results imparted by ATG.

Kim YK, et al in 2014 [53] did a comparative study of autogenous teeth used for bone grafting: with traditional grafting materials and concluded , The mineralized dentin is very slowly remodeled in comparison to cortical bone or most biomaterials the esthetic and structure pattern of the alveolar crest and mucoperiosteum is maintained for years. [54]

The surface structure design of dentin by the supersonic treatment might easily produce new functional scaffolds, which control the bio-absorption rate and the adsorption ability for protein and cells.

4.6. STRUCTURE

Huggins & Reddi., et al in 1973 [45] studied about The acid-insoluble collagen, DBM and DDM, possess the ability to coagulate platelet-free heparinized, citrated, and oxalated blood plasmas . Clotting constituents become denatured in contact with the insoluble coagulant proteins. The coagulation action of blood plasma by DBM and DDM should become advantageous for surgical operations. Collagenous materials has been commercially available as medical uses for more 30 years

Murata et al.*, in 1998 [50]studied the nature of BMP in DDM and DBM and there is an* independent differentiation of bone and cartilage was compatible to our previous study using ceramic and collagen combined with BMPs .

Kim et al., 2010 [55] found These facts are scientifically very important for the processing procedures of hard tissue derived graft materials .

Murata et al, *in 2010* [50] done a comparative study on Demanerialized dentin matrix (DDM) and demenerialized bone matrix (DBM) . Even after the demineralization of dentin, active types of BMPs bind collagen-rich matrices, similar to bone. The decalcified dentin (DDM) was known to be more active bone-inducing

matrix than the calcified dentin, and roll type of decalcified dentin membrane revealed better activity of bone induction. Very interestingly, the demineralized treament for bone and dentin increased their osteoinductivity and decreased their antigenesity

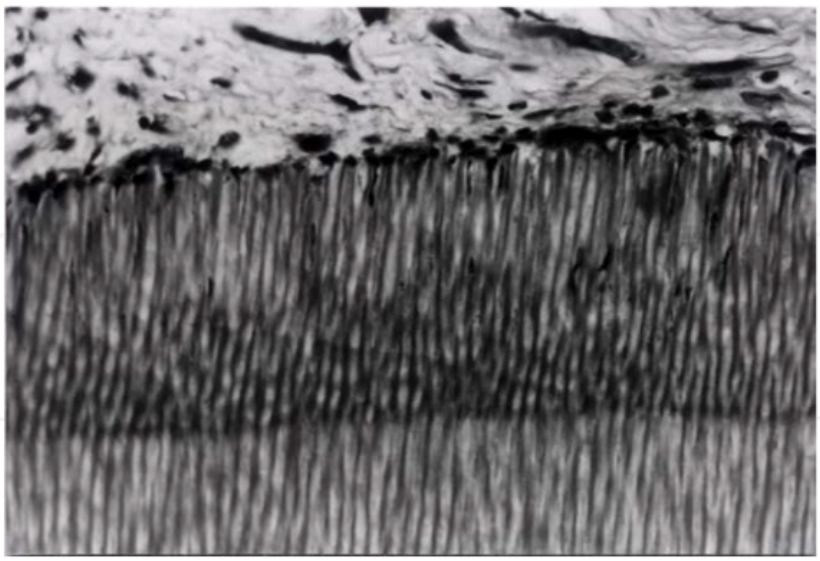


FIGURE 2: Surface of DDM granule with original dentinal tubule.

Murata et al., in the year 2010b [50] said that DDM and DBM have similar property. The acid- insoluble dentin matrix (DDM) after demineralization is an organic, absorbable material with original dentin structures. Human DDM, prepared from vital teeth-origin, were implanted into the subcutaneous tissue in 4 week-old mice, deficient in immunogenic reactions. The DDM induced bone and cartilage independently at 4 weeks after the subcutaneous implantation, similar to human DBM.

Ryuichiro tanoue et al in the year 2018 [56] studied the three dimensional ultrastructural analysis of the interface between an implanted dimeneralized dentin matrix by series of X ray CBCT and histologically through scanning electron

microscopy [SEM] over 12 weeks , and concluded that the target boundary face was reconstructed three dimensionally . The osteocytes of the new bone tissue surrounding the DDM formed a network connected by their cellular processes of osteocytes extended into the denial tubules.

Histology specimens from ATG-grafted sites showed newly formed bone associated with connective tissue stroma rich in angiogenesis. ATG particles had started to resorb and were surrounded by osteoid indicating new bone formation. Minimum fibrous tissue or no inflammatory cellular infiltration was observed.

4.7.ADVANTAGES OF AUTOGENOUS DENTIN GRAFT

- Autogenous dentin graft is bio compatible
- No secondary donor site
- Donar site preparation is simple
- Autogenous and so osteoinductive
- Rich in HA and so osteoconductive
- Osteogenetic
- No immunological host response
- Cost effective
- Can be prepared chairside
- Minimal preparation time

4.8. DISADVANTAGES OF AUTOGENOUS DENTIN GRAFT

- should be physiological nonfunctioonal tooth
- Root canal treated tooth cannot be grafted for regeneration

- Preparation is technique sensitive
- Special armamentarium required

4.9 STUDIES ON AUTOGENOUS DENTIN GRAFT

Fugazzotto PA in 1986 [57] made the use of allogenic freeze-dried dentin in the repair of periodontal osseous defects in humans.

Andersson L *in 1989* [58]found that Age had a higher impact on the rate of root resorption compared with the delay in endodontic treatment after replantation. It was concluded that a tooth replanted with a necrotic periodontal membrane
will become ankylosed and resorbed within 3-7 years in young patients, whereas a tooth replanted under similar conditions in older patients may remain in function for a considerably longer time.

Qin C in 2002 [59] studied the expression of Dentin sialoprotein (DSP) and dentin phosphoprotein (DPP) in single mRNA transcript coding for a large precursor protein termed dentin sialophosphoprotein (DSPP) and found different regulatory mechanisms governing DSPP expression are involved in tooth dentin and bone.

Schmidt-Schultz TH et al *in 2005* [60] solubilized and identified growth factors, such as insulin growth factor II (IGF-II), bone morphogenetic protein-2 (BMP-2), and transforming growth factor- beta (TGF-beta), from archaeological compact human bone and tooth dentin.

Nampo T et al in 2010 [61] in a experimental study concluded that Polymerase chain reaction revealed that the expressions of P75, P0, nestin, and musashi-1 were significantly higher in teeth than in mandibular bone and iliac bone grafts.

Osteopontin was expressed in both the tooth and iliac bone graft material at 6 and 8 weeks after surgery. Dentin sialoprotein was expressed in the tooth graft material in the new bone at 6 weeks only.

Ten Heggeler JM et al in 2011 [62] Placement of various graft materials inside freshly extracted socket is advocated by multiple studies as a "ridge preservation technique ".

Namboo t et al [56]studies ,an ideal bone graft should have the properties of osteoconduction, osteoinduction, and osteoproliferation and autogenous dentin graft possess all the property .

Horowitz R et al in 2012 [63] in Multiple studies demonstrated less ridge resorption occurring when alveolar ridge preservation procedures were used versus the placement of no graft material in fresh alveolar sockets.

Kim y k et al in 2012 [64] concluded in a study autogenous tooth bone graft materials can be considered to have physicochemical characteristics similar to those of autogen.

Itzhak Binderman et al in 2014 in his experiment performed more than 100 alveolar ridge or socket preservation and said implant insertion was possible as soon as 2-3 month after grafting of autogenous dentin and on histological , radiological evaluation a dense dentin-bone composite was found.

Frank Schwarz et al in 2018 [65] in their conclusion on autogenous dentin root graft the graft may serve as an alternative to support lateral alveolar ridge augmentation and two-stage implant placement.

CONE BEAM COMPUTED TOMOGRAPHY USE IN INTRABONY DEFECT

Moa A et al in 2000 [66] said that the advent of digital imaging modality , digital subtraction radiography, and tuned aperture computed tomography (CT) have added considerable improvements to traditional IOP A radiographs, but have their own sets of limitation including that they too represent 2D image of 3D structure.

Tyndall DA, Rathore S. In 2008 [67] done a study over A total of 100 defects were evaluated in 15 patients. The results from our study indicate that CBCT is highly accurate for diagnosing both horizontal and vertical bone defect. Furthermore, there is a high degree of correlation between clinical and CBCT measurements of bone defects.

de Faria Vasconcelos et al.[68] compared periapical radiographs with CBCT imaging in detecting and localizing alveolar bone loss. The authors concluded that CBCT offers improved visualization of the morphology of the defect. The authors had used secondary image database for CBCT comparison and did not compare CBCT measurements with clinical gold standard.

Feijo *et al.* [69] did an *in-vivo* study to evaluate the accuracy of CBCT in the detection of horizontal periodontal bone defects. They measured 72 defects in maxillary molar region in patients with periodontitis using CBCT and direct clinical measurement performed during surgical intervention. The authors found that CBCT accurately reproduced the clinical measurement of horizontal periodontal bone defects. However, this study did not evaluate the accuracy of CBCT in vertical defects measurement.

MATERIALS AND METHODS

SOURCE

The study population was selected from the outpatient sections of the Department of Periodontics , TNGDC and Hospital, Chennai.

INCLUSION CRITERIA

- Patients with age group between 20-50 years.
- Systemically healthy patients with clinical attachment level (CAL) ≥ 5mm ; bleeding on probing (BOP) and probing depth (PD) 5-6mm. intrabony defect confirmed by periapical radiographs;
- Patients with no history of periodontal therapy in the past 6 months.
- Patients without any antibiotic treatment in last six months.
- Patients with established willingness and ability to perform adequate oral hygiene.
- Patient having a Vital tooth indicated for extraction which could be used for autograft. (non functional third molar).

EXCLUSION CRITERIA

- Systemic illness known to affect the outcomes of periodontal therapy such as diabetes mellitus, cardiac disease, immunocompromised condition
- Alcoholics and smokers
- Pregnant and lactating females were not included in the study

SUBJECTS

A total of 10 patients with periodontal intra bony defects were selected.

STUDY DESIGN

The study was purely a experimental clinical trial.

SEX

Either sex were included in the study.

OPERATIONAL DEFINITION

Scaling – Process by which plaque and calculus were removed from both Supra gingival and Sub gingival tooth surfaces.

Root planing – Process by which residual embedded calculus and portions of cementum were removed from the roots to produce a smooth hard and clean surface.

Sulcus bleeding index - An assessment tool used to verify the presence of gum inflammation based on bleeding that occurs around the gingival sulcus upon gentle probing with the standard periodontal probe.

Pocket probing depth – Measurement of depth of the periodontal pocket determined by measuring the distance from the gum margin to the base of the sulcus or pocket with a calibrated periodontal probe.

Periodontal Flap surgery : surgical separation of the mucogingival tissue from underlying tissues to provide accessibility and visibility to the bone and root surface.

METHOD OF COLLECTING DATA

ARMAMENTARIUM:

For Clinical Examination:

- Mouth mirror
- Williams Periodontal probe
- Kidney tray
- Cotton roll
- Sterilized disposable gloves, head cap, facemask

- IOPA film with radiographic grid
- CBCT in the region of interest

For Phase I therapy:

- Mouth mirror
- Williams Periodontal probe
- Kidney tray
- Ultrasonic scaler(Guilin Woodpecker,UDS-J ultrasonic scaler)
- Cotton rolls
- Sterilized disposable gloves, head cap, face-mask
- Disposable syringes
- Local anaesthetic solution
- Hu-Friedy Gracey Curette
- For Phase II Therapy
- Mouth mirror
- Williams Periodontal probe
- Nabers probe
- Surgical blades
- Curettes and scalers
- Periosteal elevators
- Scissors
- Needle holders and suture material
- Normal saline
- Sterile dentin grinder, conventional domestic grinder
- Non eugenol periodontal dressing

METHOD:

Based on the inclusion and exclusion criteria, the study population was selected from the outpatient sections of the Department of Periodontics, TNGDC and Hospital, Chennai.

Study was purely of Longitudinal clinical trial type.

Scaling and root planing followed by flap surgery with autogenous dentin graft in the periodontal intrabony graft was performed

PRESURGICAL PROCEDURE

- Clinical case history record and clinical photographs.
- Clinical probing depth was assessed
- Intraoral periapical radiographs using long cone paralleling technique and radiographic grid was taken
- Cone Beam Computed Tomography was taken
- Routine haematological investigations were performed
- Phase I therapy, included oral hygiene instructions, scaling and root planing using hand and ultrasonic instruments, were performed. Adjunctive chemical plaque control in the form of chlorhexidine mouthwash 0.12% twice daily was advised.

SURGICAL PROCEDURE

After getting informed consent adequate local anesthesia (2% xylocaine with epinephrine, 1:200,000) was given, an intrasulcular incision was made around the involved teeth with an extension to the adjacent tooth for adequate access.

Mucoperiosteal flap was reflected to access the underlying bone morphology . The area had been properly debrided using Gracey curettes and autogenous dentin

graft was placed in the intrabony defect. The reflected flap was repositioned and secured with 3-0 non resorpbable silk sutures, periodontal dressing was placed.

PREPARATION OF AUTOGENOUS DENTIN GRAFT

The vital tooth with out any root canal restorations which are indicated for extraction due to periodontal bone loss, an impacted or partially impacted non functional third molar, or a tooth extracted during orthodontic treatment were considered for preparation of autogenous dentin graft for immediate grafting in intrabony defect. Discoloured dentin, cementum, enamel, periodontal ligament were reduced by using tungsten carbide bur. Root splitting was done if tooth was multi rooted. Then the tooth fragments were placed in sterile dentin grinder chamber and grinding was done .

Grinder with speed greater than 700 Rpm and power of 1500 watts was capable of grinding the tooth into particulate dentin graft within a minute time. The graft particle sorting was done by passing it through sterile sieves measuring 1200 µm and then 500 µm . This grinding and sorting protocol was repeated to grind the remnants. The graft sterlization was done by immersing the graft particle in 1N lactic acid for 20 minutes . This lactic acid partially decalcify's the graft , and later using sterile normal saline, the graft particles were thoroughly washed for 60 s to remove any residual traces of lactic acid .

POST OPERATIVE INSTRUCTIONS

- Suitable antibiotics and analgesics was prescribed.
- The patient was instructed to continue regular home hygiene care, except in the operated area, in which tooth brushing discontinued for 7 days after surgery and

plaque control was maintained by means of gentle topical applications of chlorhexidine gluconate in saturated cotton swabs twice a day. Gentle toothbrushing with an extra soft bristle toothbrush (Postsurgical toothbrush) using Charter's method was initiated.

- Periodontal dressings and sutures was removed 7-10 days after surgery.

CLINICAL PARAMETERS

1. Plaque index (Silness and Loe, 1964) (PI)
2. Sulcus Bleeding Index (Ainamo and Bay, 1975) (SBI)
3. Pocket Probing depth (using Williams probe)
4. Clinical attachment level

PLAQUE INDEX (SILNESS AND LOE 1964)[70]

All teeth were examined at 4 sites each (disto-facial, facial, mesio-facial, lingual / palatal) and were scored as follows:

Scoring Criteria:

Score 0: No plaque in the gingival area.

Score 1: A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque is recognized only by running a probe across the tooth surface.

Score 2: Moderate accumulation of plaque within the gingival pocket and on the gingival margin and / or adjacent tooth surface that can be seen by the naked eye.

Score 3: Abundance of soft deposits within the gingival pocket and / or on the gingival margin and adjacent tooth.

Calculation:

Plaque index per tooth = Total score / 4

Plaque index per individual = Total PI per tooth

Total number of teeth examined

Interpretation:

Score 0: Excellent oral hygiene

Score 0.1 to 0.9: Good oral hygiene

Score 1.0 to 1.9: Fair oral hygiene

Score 2.0 to 3.0: Poor oral hygiene

GINGIVAL BLEEDING INDEX

(Ainamo & Bay 1975)[71]

Starting distobuccally, the probe was gently inserted into the sulcus and ran to the buccal and mesial surfaces of every tooth at an angle of about 45o. This was repeated for all the teethpresent. Similarly probing was carried out at palatal/lingual sites. The total number of bleeding sites per tooth was thus recorded for every tooth except the third molar.

Scoring Criteria:

Positive score (1) - Presence of bleeding within 10 seconds

Negative score (0) - Absence of bleeding

% of bleeding sites = Total number of positive score x 100

Total number of surfaces of all teeth

PROBING POCKET DEPTH (PPD) [72]

Probing Pocket Depths were measured from the gingival margin to the base of the pocket in millimeters using William's Periodontal Probe. The probe was walked within the gingival sulcus along the circumference of the tooth. Keeping the probe parallel to the long axis of the selected tooth, six measurements were made per tooth (Mesiobuccal, Distobuccal, Midbuccal, Mesiolingual, Distolingual and Midlingual).

CLINICAL ATTACHMENT LEVEL (CAL) [72]

The Clinical Attachment Level was using William's Periodontal Probe measured from the Cemento Enamel Junction (CEJ) to the base of the pocket. The probe was placed parallel to the long axis of the tooth and readings were recorded at six different sites. (Mesiobuccal, Distobuccal, Midbuccal, Mesiolingual, Distolingual and Midlingual)

RADIOGRAPHIC MEASUREMENTS

Intraoral periapical radiographs were taken for each site using long cone paralleling technique and XCP holders at baseline, 3 months and 6 months postoperatively.

The radiographs were digitized using digital camera81 (canon power shot sx260 HS), and the images were analysed using Adobe Photoshop version 10.0.

The following anatomical landmarks (Photograph 10a) of the intrabony defect were identified on the radiograph images based on the criteria set by **Bjorn et al [73]** and by **Schei et al [83]**

1. CEJ: The cemento-enamel junction of the tooth with the intrabony defect.

2. AC: The most coronal position of the alveolar bone crest of the intrabony defect

when it touches the root surface of the adjacent tooth before treatment. (The top of the crest)

3. BD: The most apical extension of the intrabony defect where the periodontal ligament space still retained its normal width before treatment. (The bottom of the defect)

For measurements, connector line tool of the software was used. A line was drawn from CEJ to the base of the defect and then a perpendicular was drawn from the alveolar crest to this line to obtain the distance between CEJ and alveolar crest. Also, a line was drawn from CEJ to root apex (Photograph 10b). All measurements were recorded in millimeters.

The following linear measurements were made.[75,72] .

1. CEJ to bottom of the defect (CEJ to BD) = Defect Depth (DD)

2. CEJ to most coronal extent of the alveolar crest (CEJ to AC)

3. Depth of the intrabony defect at baseline = (CEJ to BD) -(CEJ-AC)

4. Correction factor: In order to estimate distortion between the consequent radiographs, an anatomically non-variable distance i.e., the root length [distance from the CEJ to the root apex (CEJ to RA)] was measured on all the radiographs.

The correction factor (CF) was calculated as follows

Correction Factor = CEJ to RA (baseline) CEJ to RA (post-op) In cases where it was not possible to measure the root length, the crown length was measure (Distance) from incisal margin of the crown to the CEJ).

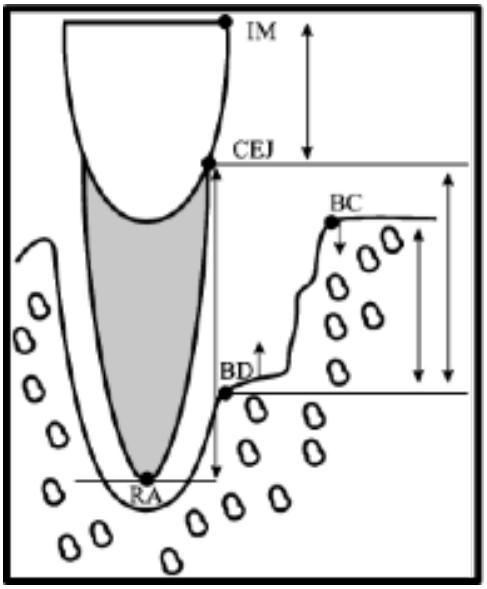
5. Bone fill (BF) = CEJ to BD (baseline) —[CEJ to BD (post op) x CF].

6. Bone fill percentage (BF %) = Bone fill x 100 Defect Depth (at baseline).

7. Bone crest change (BCC) = CEJ to AC (baseline) [CEJ to

AC (post op) x CF] .

8. Bone crest change percentage (BCC%) = Bone Crest Change x 100 CEJ AC (baseline) .If the results were negative, this means that a process of bone resorption had occurred.[75]



CEJ - cemento enamel junction
BD - bone depth
BC. - bone crest
RA. - root apex
IM - incisal margin

Schematic drawing illustrating the anatomical landmarks

and linear measurements taken from digitized radiographs.

9. Amount of original defect resolution (DR) = Bone fill (BF) bone crest change (BCC).

10. Percentage (%) of original defect resolution= Defect Resolution x 100 Depth of intrabony defect (BL).

All the above mentioned observations were recorded and subjected to statistical analysis.

INVESTIGATIONS

HAEMATOLOGICAL INVESTIGATION :

- Routine hemogram

RADIOGRAPHIC EVALUATION :

- Intra-Oral Periapical Radiograph (IOPA)
- Ortho Pantomo Gram (OPG)
- Cone Beam Computed Tomography (CBCT)

POST SURGICAL EVALUATION AND REVIEW

1. Post-surgical evaluation was done at 1 week, 3 months and 6 months
2. Intraoral periapical radiographs was taken using long cone paralleling technique, with grid in position following scaling and root planning, and after 3 and 6 months reassessment to evaluate the post treatment bone fill.
3. Probing Pocket Depth, Clinical Attachment Levels were reassessed with the previously used acrylic stents during the post surgical evaluation.

PHOTO 1 : ARMAMENTARIUM

PHOTO 2 : XCP HOLDERS

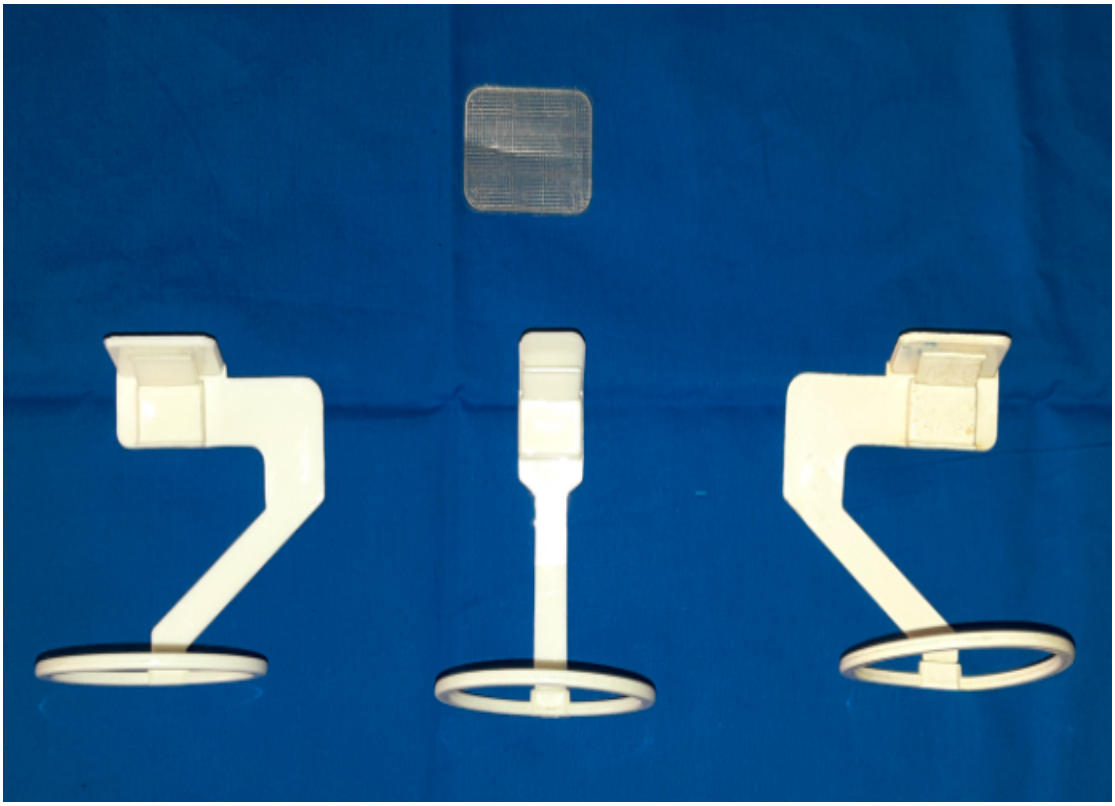


PHOTO 3A : ARMAMENTARIUM FOR GRAFT PREPARATION

PHOTO 3B : TOOTH GRINDER

PHOTO 4 : PRE OPERATIVE VIEW

PHOTO 4 A: PRE OPERATIVE OCCLUSAL VIEWS

PHOTO 4B: PROBING DEPTH

PHOTO 4C : PRE OPERATIVE IOPA

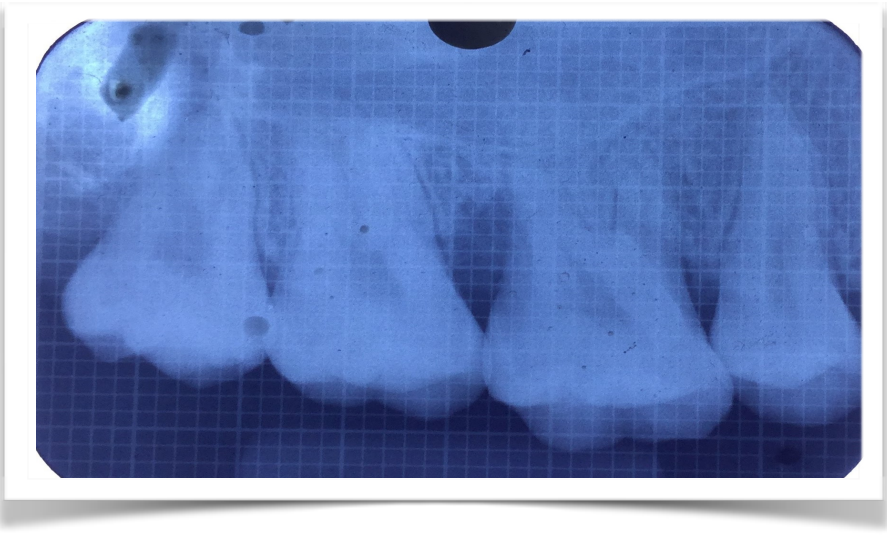


PHOTO 5 : RADIOGRAPHIC PARAMETER PRE OPERATIVE - CBCT

PHOTO 5A : SAGITAL VIEW

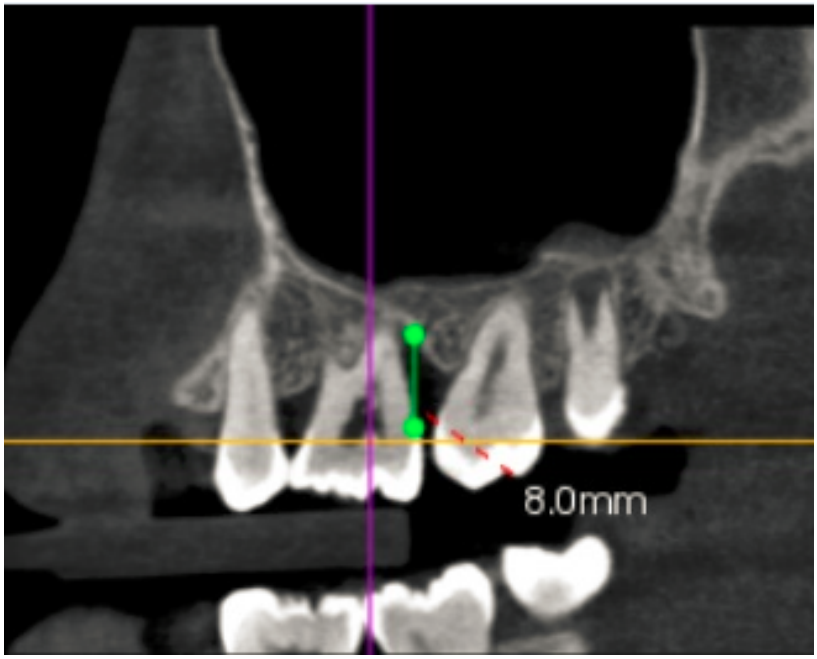


PHOTO 5B: CORONAL VIEW

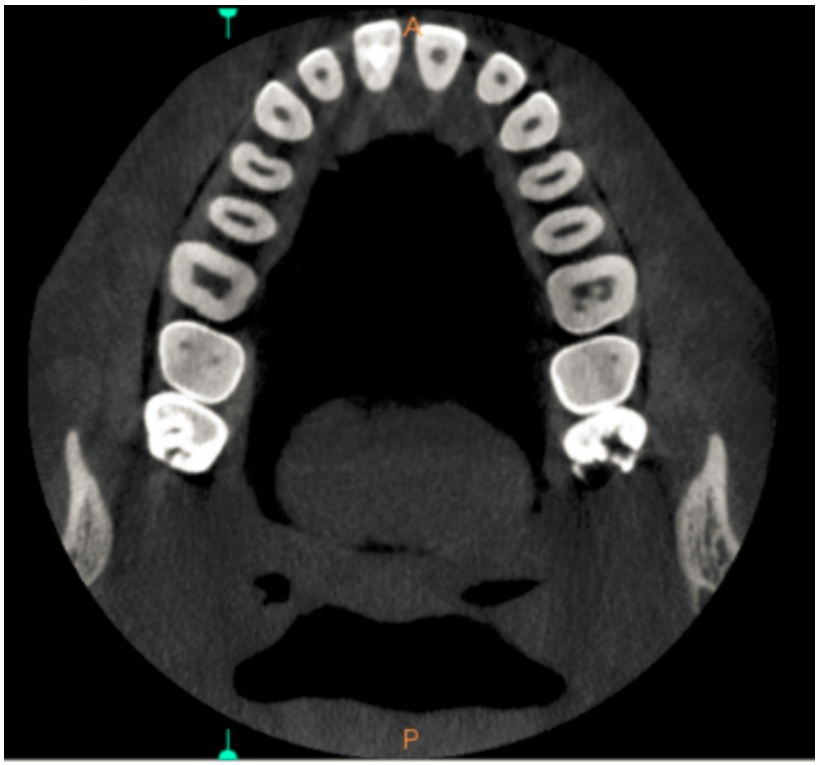


PHOTO 6 : TOOTH PREPARATION FOR GRAFT

PHOTO 6A:EXTRACTED TOOTH

PHITO 6B: TOOTH SPLITTED

PHOTO 6C:TOOTH IN GRINDER

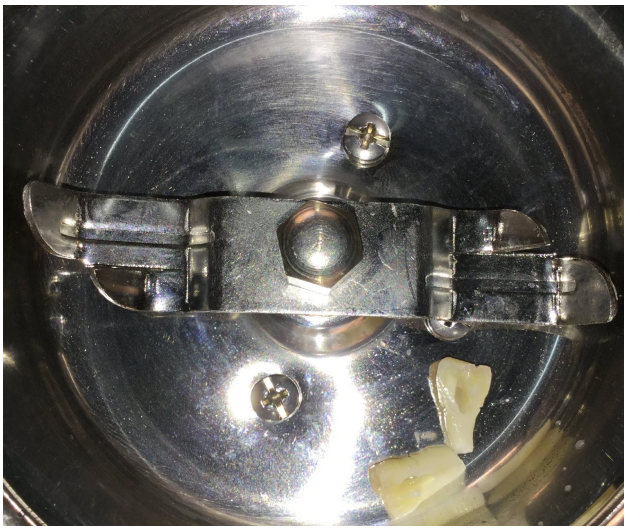


PHOTO 6D: THE ADG

PHOTO 7 : INTRA OPERATIVE VIEWS

PHOTO 7 A : INTRABONY DEFECT

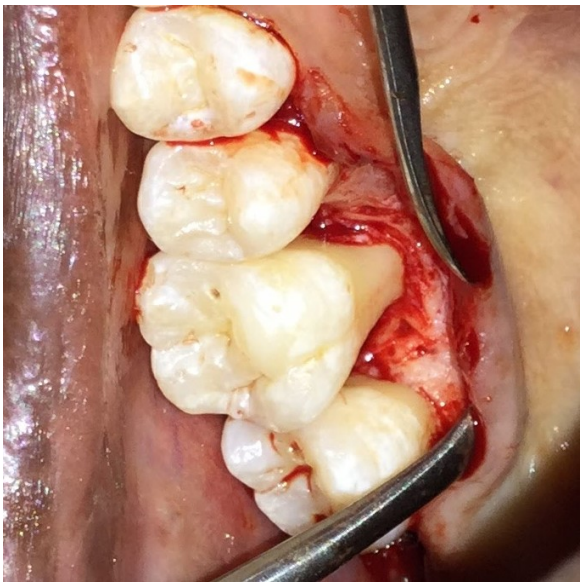


PHOTO 7B: PRESUTURING O

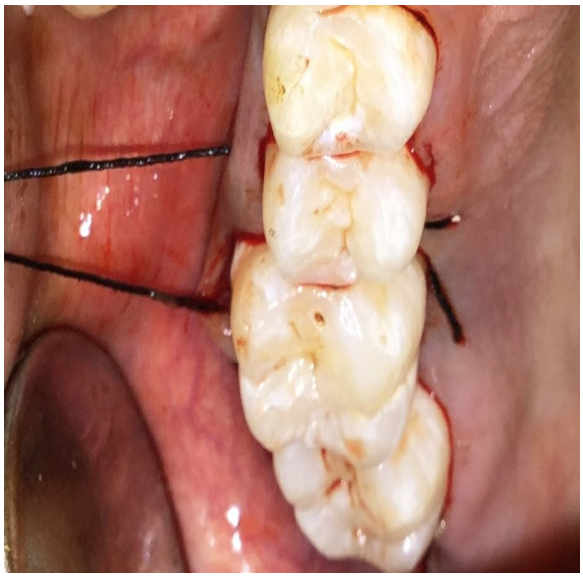


PHOTO 7C : GRAFT IN DEFECT

PHOTO 7D : PRIMARY CLOSURE

PHOTO 8 : POST OPERATIVE

PHOTO 8 A : CLINICAL VIEW

PHOTO 8 B : RADIOGRAPHIC VIEW

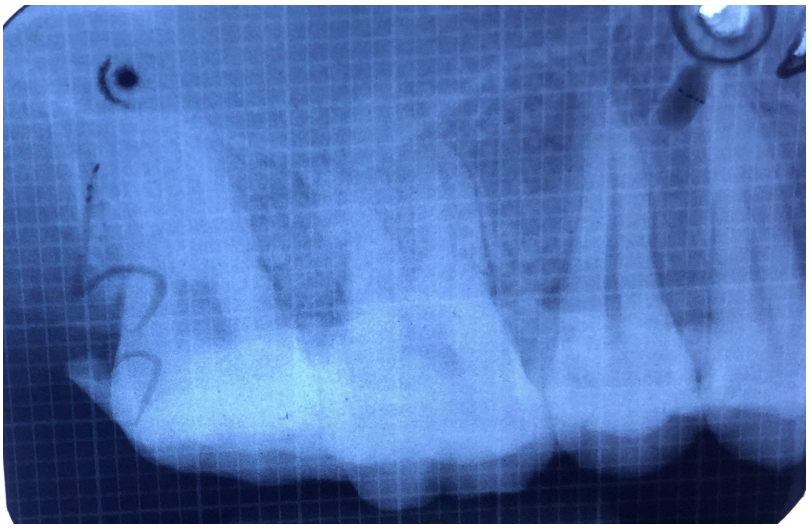


PHOTO 9 : RADIOGRAPHIC PARAMETER POST OPERATIVE

PHOTO 9A : CORONAL VIEW

PHOTO 9B : SAGITAL VIEW

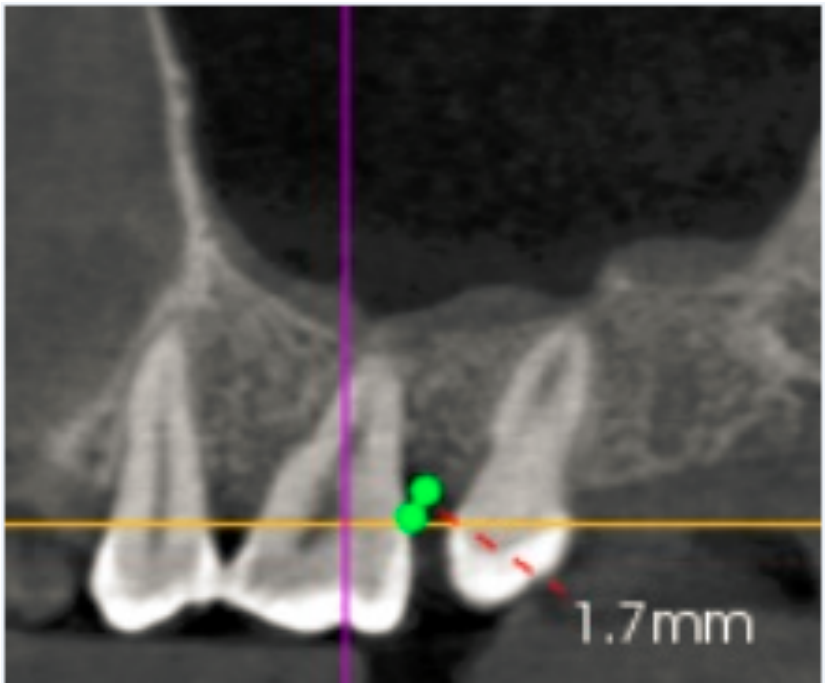


PHOTO 10 : COMPARISION OF CLINICAL PARAMETERS

PHOTO 10 A ; PROBING DEPTH AT BASELINE

PHOTO 10B :PROBING DEPTH AT 6 MONTHS

PHOTO 11 : COMPARISION OF RADIOLOGICAL PARAMETER CBCT

PHOTO 11 A : PRE OPRATIVE CBCT

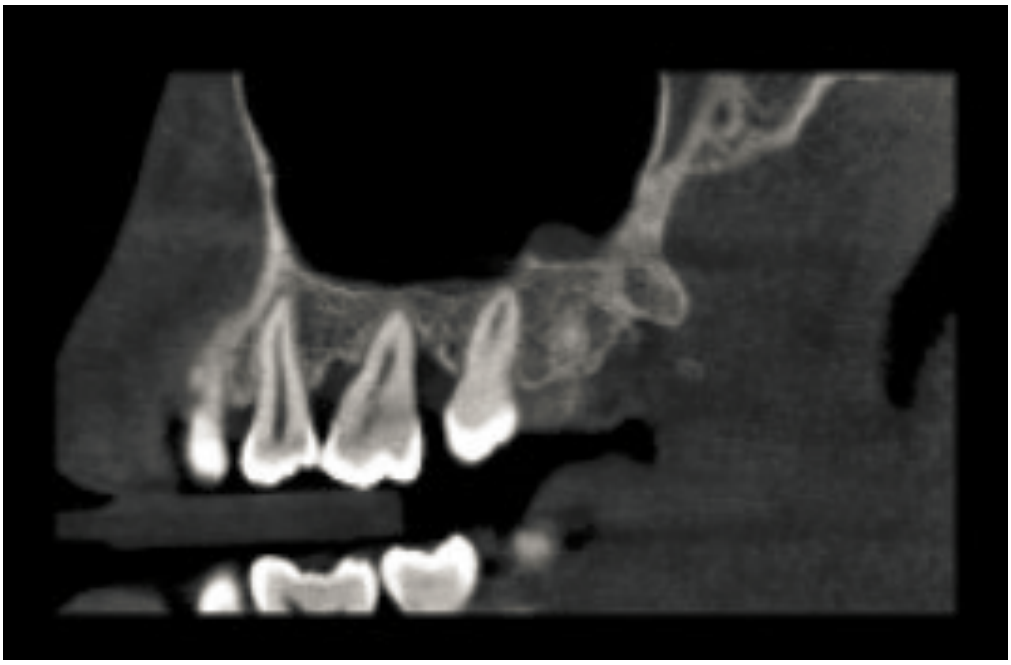
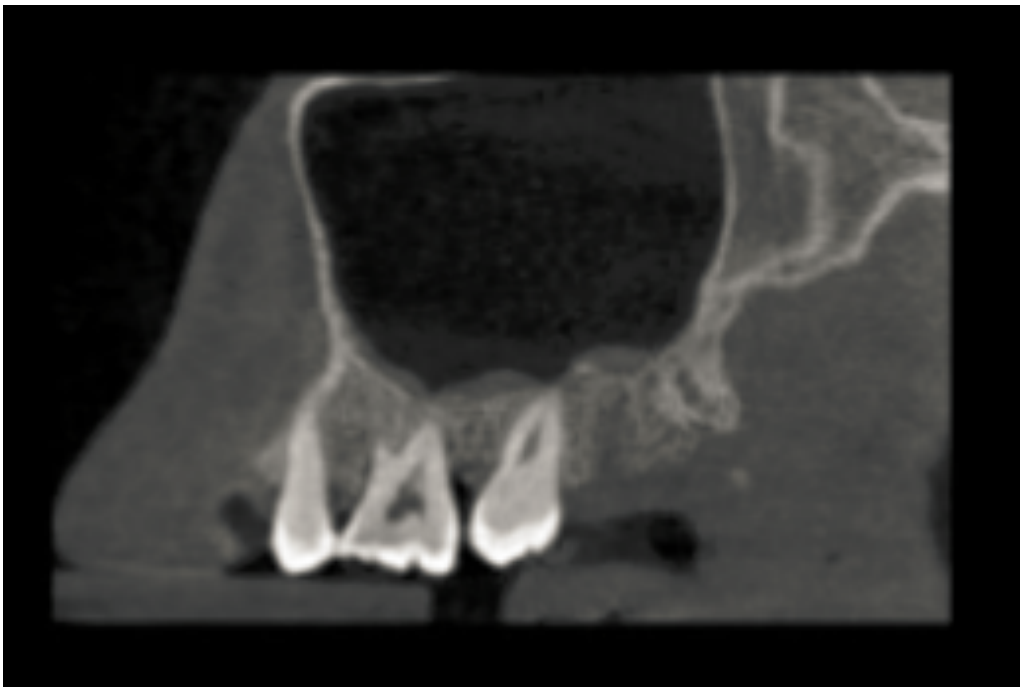


PHOTO 11 B. : POST OPRATIVE CBCT



STATISTICAL ANALYSIS

The statistical analysis was done using the computer software program SPSS version 16 (IBM CORP, CHICAGO, IL, USA). Descriptive data are presented as mean ± SD and range values.

Data of parameters plaque index (PI), gingival bleeding index (GBI), probing pocket depth (PPD),, clinical attachment level (CAL) and defect dimension (DD), bone mineral density in hounsfield units at baseline 3 months, and 6 months were assessed. The intragroup comparison was done by repeated measures ANOVA test. The paired t test was used for bone fill (BF), and bone fill percentage (BF %).

The **p value** or calculated probability was the estimated probability of rejecting the null hypothesis (H0) of a study question when that hypothesis was true. The smaller the p-value, the more significant the result was said to be. Confidence intervals were calculated at the 95% level. Differences between the two time intervals were considered significant when $p \leq 0.05$.

PAIRED-T-TEST / WILCOXON SIGNED RANK TEST:

- To compare the means before and after the treatment of the clinical parameters (PPD and CAL) and radiological parameter (intrabony defect fill level).

STATISTICAL FORMULAE USED FOR DATA ANALYSIS

Paired sample t test for

$$t = \frac{\Sigma d}{\sqrt{\frac{n\left(\Sigma d^2\right)-\left(\Sigma d\right)^2}{n-1}}}$$

RESULTS

The present clinicoradiographic study was carried out with the aim to compare and evaluate the efficacy of autogenous dentin graft in the treatment of human periodontal intrabony defects. All the patients who were enrolled in the study returned for scheduled maintenance visits. A total of 10 sites exhibiting radiographic vertical / angular osseous defects in 9 patients within the age group of 20-45 years were selected for the study. The final results and statistical analysis was done for a total of 10 sites.

10 sites were treated with open flap debridement followed by placement of autogenous dentin graft

All patients showed good compliance and healing period was uneventful for both the groups, without any signs of infections and complications, indicating biocompatibility of both grafting modalities. The observations and results of various parameters are summarized in the tables and figures. Clinical parameters for the groups are listed in table 1 and 6 for their master chart observations and mean ± SD values respectively. Radiographic parameters are listed in tables 2, 4, 3 for their master chart observations, correction factor values and radiographic parameters respectively. bone mineral density is discussed in table 5 .

CLINICAL PARAMETERS

1. Plaque Index

The mean plaque index score at baseline was 1.70 ± 0.675 and at 6 months was 0.60 ± 0.516. The mean reduction in plaque index from baseline to 6 months was 1.100 which was statistically significant (p=0. 001)

2. Gingival Bleeding Index

The mean Gingival bleeding index at baseline was 47.90 ± 8.279 and at 6 months was 9.00 ± 2.494 Gingival bleeding index value compared between baseline and 6 months was found to be statistically significant. (p=0.00) and the mean difference was 38.900.

3. Probing pocket depth

The mean pocket depth at baseline was 8.90 ± .994 and at 6 it months was 1.40 ± 0.516. The mean reduction in pocket depth from baseline to 6 months was 7.500 which was statistically significant (p= 0.000).

4. Clinical Attachment level

The mean attachment level at baseline was 9.00 ± .943 and at 6 it months was 1.40 ± .516. The mean gain in attachment level from baseline to 6 months was 7.600 which was statistically significant (p=0.000).

RADIOGRAPHIC PARAMETERS

1. Defect depth

The mean defect depth at baseline was 5.31 ± 0.78, at 3 months was 3.78 ± 1.89 and at 6 months was 2.81 ± 1.76. The mean difference in defect depth from baseline to 3 months was 1.53 which was statistically significant (p = 0.005) .The mean difference in defect depth from baseline to 6 months was 2.5 which was also statistically significant (p=0.001).The mean difference in defect depth from 3 months to 6 months was 0.96 which was statistically significant (p=0.019)

2. Bone Fill

The mean bone fill at 3 months was 2.17 ± 0.76 and at 6 months was 2.94 ± 1.02. The mean difference in bone fill from 3 months to 6 months was 0.77 which was statistically significant (p = 0.008).

3. Bone Fill %

The mean bone fill percentage at 3 months was 39.09± 14.62 and at 6 months was 62.35 ± 15.59. The mean difference in bone fill percentage from 3 months to 6 months was 23.26 which was statistically significant (p = 0.000).

4. Bone crest change

The mean change in bone crest at 3 months was 0.29 ± 0.55 and at 6 months was 0.62 ± 0.46. The mean difference in change in bone crest from 3 months to 6 months was 0.330 which was statistically significant (p = 0.002).

5. Bone Crest change %

The mean percentage change in bone crest at 3 months was 6.27 ± 12.01and at 6 months was 11.2 ± 10.62. The mean difference in percentage change in bone crest from 3 months to 6 months was 4.93 which was statistically significant (p = 0.011).

6. Defect resolution %

The mean percentage defect resolution at 3 months was 35.09 ± 15.88 and at 6 months was 53.85 ± 14.02. The mean difference in percentage defect resolution from 3 months to 6 months was 18.76 which was statistically significant (p =0.000).

CBCT - BONE MINERAL DENSITY

The mean bone mineral density at baseline was 27.10± 42.52, at 3 months was 334.30 ± 97.61and at 6 months was 727.40 ± 154.99. The mean difference in bone mineral density from baseline to 3 months was 307.20 which was statistically significant (p = 0.000) .The mean difference in bone mineral density from baseline to 6 months was 700.30 which was also statistically significant (p=0.000).The mean difference in bone mineral density from 3 months to 6 months was 393.10 which was statistically significant (p=0.000) .

MASTER CHART 1 - CLINICAL PARAMETERS

TABLE 1 - MASTER CHART 1 - CLINICAL PARAMETERS														
DESCRIPTION			**BASELINE**				**AFTER 3 MONTHS**				**AFTER 6 MONTHS**			
S.NO	**AGE**	**SEX M/ F**	**PI**	**GBI %**	**PPD mm**	**CAL mm**	**PI**	**GBI %**	**PPD mm**	**CAL mm**	**PI**	**GBI mm**	**PPD mm**	**CAL mm**
1	34	M	1.6	53.5	9	9	1	29.5	4	4	0.4	14.5	2	2
2	20	M	1.7	58.5	8	8	1.1	16.5	4	4	0.6	7.7	1	1
3	21	M	1.2	61.3	9	9	0.7	23.5	4	4	0.4	11.2	1	1
4	42	M	1.3	52.1	8	9	0.8	21.5	5	5	0.6	6.5	2	2
5	26	M	1.6	46.5	9	9	0.9	24.8	4	4	0.7	12.1	1	1
6	25	M	1.1	43.5	11	11	0.6	20.4	5	5	0.6	8.2	2	2
7	24	M	1.4	39.4	10	10	0.8	14.3	5	5	0.5	7.7	1	1
8	27	M	1.5	46.7	9	9	0.8	19.4	4	4	0.6	8.3	2	2
9	32	M	1.9	34.8	8	8	1.3	11.1	3	3	0.4	7.8	1	1
10	37	M	2.7	43.4	8	8	1.1	22.2	3	3	0.7	7.3	1	1

RADIOGRAPHIC MEASUREMENTS in mm

TABLE 2 - MASTER CHART 2 - RADIOGRAPHIC MEASUREMENTS in mm										
DESCRIPTION			**BASE LINE**		**AT 3 MONTHS**			**AFTER 6 MONTHS**		
S.NO	**AGE**	**SEX**	**CEJ -BD**	**CEJ -AC**	**CEJ-BD**	**CEJ-AC**	**CF3**	**CEJ-BD**	**CEJ-AC**	**CF6**
1	34	M	11.92	5.65	7.42	4.45	0.91	4.85	4.01	1.07
2	20	M	9.92	4.42	6.53	4.22	0.92	5.23	3.91	1.15
3	21	M	9.83	4.73	6.43	4.63	1.01	5.63	3.61	1.02
4	42	M	8.95	4.13	7.07	3.71	0.9	6.43	3.65	0.92
5	26	M	14.35	5.93	11.41	4.95	0.83	8.85	4.95	0.85
6	25	M	11.46	4.79	9.59	4.53	8.16	5.83	4.51	0.18
7	24	M	12.95	5.63	11.45	5.41	0.65	10.64	5.36	0.61
8	27	M	9.25	4.31	6.74	4.15	0.45	6.04	4.11	0.44
9	32	M	7.66	3.43	6.66	2.21	0.66	4.06	3.03	0.63
10	37	M	8.43	4.49	7.63	4.34	0.65	4.99	3.94	0.71

CORRECTION FACTOR FOR RADIOGRAPHS

TABLE 3 - CORRECTION FACTOR							
S.NO	**AGE**	**SEX**	**CEJ -RA AT BASE LINE**	**CEJ-RA 3 MONTHS**	**CEJ -RA 6 MONTHS**	**CF3**	**CF6**
1	34	M	18.5	17.59	17.56	0.91	1.07
2	20	M	18.73	17.83	17.6	0.92	1.15
3	21	M	14.54	14.05	14.04	0.45	0.44
4	42	M	18.24	17.35	17.33	0.9	0.92
5	26	M	17.76	16.93	16.91	0.83	0.85
6	25	M	17.59	16.64	16.66	0.16	0.18
7	24	M	16.63	15.95	15.91	0.65	0.61
8	27	M	18.11	17.1	17.09	1.01	1.02
9	32	M	14.75	13.09	13.05	0.66	0.63
10	37	M	18.39	17.95	17.01	0.65	0.71

RADIOLOGICAL PARAMETERS IN HOUNSFIELD UNITS

TABLE 4 - MASTER CHART 4 - RADIOLOGICAL PARAMETERS IN HOUNSFIELD UNITS					
S.NO	**AGE**	**SEX M/F**	**BMD BASE LINE**	**BMD 3 MONTHS**	**BMD 6 MONTHS**
1	34	M	-45	410	849
2	20	M	50	381	798
3	21	M	10	182	693
4	42	M	62	253	456
5	26	M	-19	395	567
6	25	M	-23	293	765
7	24	M	61	199	568
8	27	M	53	354	756
9	32	M	49	403	891
10	37	M	73	473	931

RADIOLOGICAL PARAMETER - INTRAORAL PERI APICAL RADIOGRAPHS

TABLE 5 - MASTER CHART 5 - RADIOLOGICAL PARAMETER													
S.NO	**DD-BL**	**DD3**	**DD6**	**BF3 in mm**	**BF6 in mm**	**BF3 %**	**BF6%**	**BCC3 mm**	**BCC6 mm**	**BCC3%**	**BCC 6%**	**DR 3%**	**DR 6%**
1	4.57	3.87	1.39	1.53	3.13	45.51	70.35	1.13	1.02	31.66	28.66	12.9	55.49
2	4.05	2.31	1.63	1.94	2.27	34.55	69.05	0.24	0.82	0.54	11.71	33.4	58.38
3	6.02	4.74	4.78	2.41	3.19	39.05	55.9	0.96	1.23	16.44	19.09	29.9	45.3
4	4.42	1.92	1.9	2.83	2.59	47.61	69.05	-0.09	0.32	-3.05	4.44	54.9	60.1
5	4.67	2.05	2.32	1.93	2.35	37.51	56.07	0.15	0.79	2.56	16.5	37.1	47.5
6	4.32	5.76	5.34	0.73	1.65	16.51	35.06	0.21	0.47	2.09	4.32	19.35	30.9
7	6.94	5.76	4.93	1.51	2.05	21.01	40.5	-0.56	-0.21	-8.49	-6.09	25.5	43.5
8	4.23	1.67	0.76	2.95	3.93	67.05	86.55	-0.32	0.23	-1.95	2.29	65.3	83.4
9	5.94	2.87	1.05	2.93	3.06	50.1	75.05	0.29	0.35	5.89	8.09	43.3	64.5
10	8.01	6.87	4.03	2.95	5.19	32.05	65.98	0.9	1.19	17.01	22.99	29.3	49.49

COMPARISION OF CLINICAL PARAMETERS

TABLE 6 - MASTER CHART - COMPARISON OF CLINICAL PARAMETERS				
PARAMETERS	**BASELINE**	**3 MONTHS**	**6 MONTHS**	**p VALUE**
	(MEAN ± SD)	**(MEAN ± SD)**	**(MEAN ± SD)**	
PLAQUE INDEX	1.70 ± .675	1.00 ± 0.000	.60 ± .516	0.001*
GINGIVAL BLEEDING INDEX	47.90 ± 8.279	20.30 ± 5.599	9.00 ± 2.494	0.000*
POCKET PROBING DEPTH	8.90 ± .994	4.10 ± .738	1.40 ± .516	0.000*
CLINICAL ATTACHMENT LEVEL	9.00 ± .943	4.10 ± .738	1.40 ± .516	0.000*

PAIRED T TEST FOR INTRA GROUP COMPARISION * SIGNIFICANT

COMPARISON OF RADIOLOGICAL PARAMETERS

TABLE 7 - MASTER CHART - COMPARISON OF RADIOLOGICAL PARAMETERS				
PARAMETERS	**BASELINE**	**3 MONTHS**	**6 MONTHS**	**p VALUE**
	(MEAN ± SD)	**(MEAN ± SD)**	**(MEAN ± SD)**	
CEJ TO BONE DEPTH	10.27 ± 2.13	8.09 ± 1.98	6.25 ± 2.00	0.000*
CEJ TO ALVEOLAR CREST	4.75 ± 0.78	4.26 ± 0.85	4.12 ± 0.67	0.002*
CEJ TO DEFECT DEPTH	5.31 ± 1.34	3.78 ± 1.89	2.81 ± 1.76	0.001*
BONE FILL	-	2.17 ± 0.76	2.94 ± 1.02	0.008*
BONE FILL (%)	-	39.09 ± 14.62	62.35 ± 15.59	0.000*
BONE CREST CHANGE	-	0.29 ± 0.55	0.62 ± 0.46	0.002*
BONE CREST CHANGE (%)	-	6.27 ± 12.01	11.2 ± 10.62	0.011*
DEFECT RESOLUTION	-	35.09 ± 15.88	53.85 ± 14.20	0.000*
BONE MINERAL DENSITY	27.10 ± 42.52	334.30 ± 97.61	727.40 ± 154.99	0.000*

PAIRED T TEST FOR INTRA GROUP COMPARISION

* SIGNIFICANT

FIGURE 3 : COMPARISION OF MEAN PLAQUE INDEX

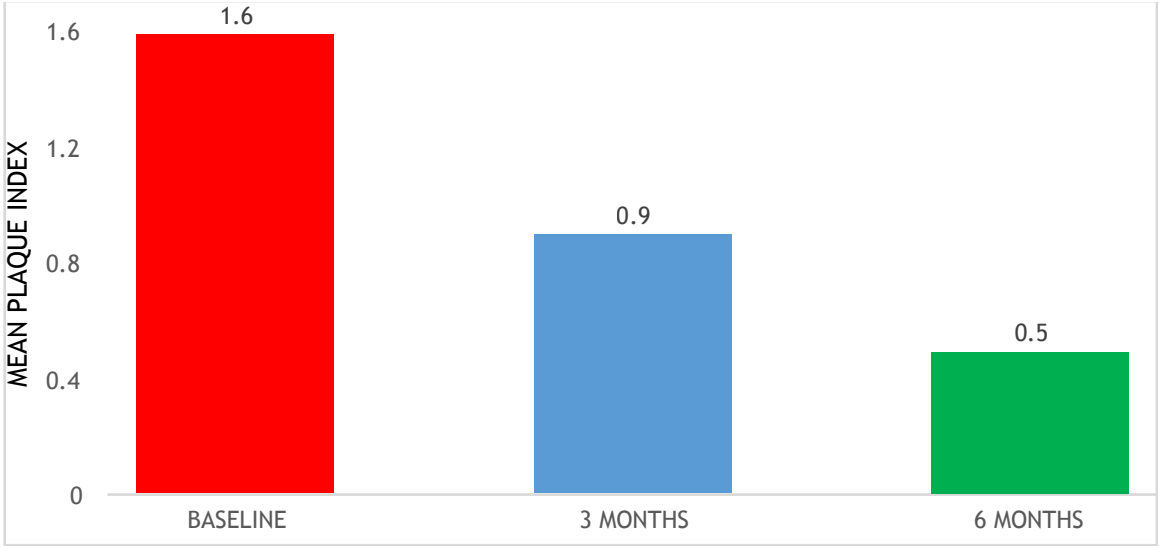


FIGURE 4 : COMPARISION OF MEAN GINGIVAL BLEEDING INDEX

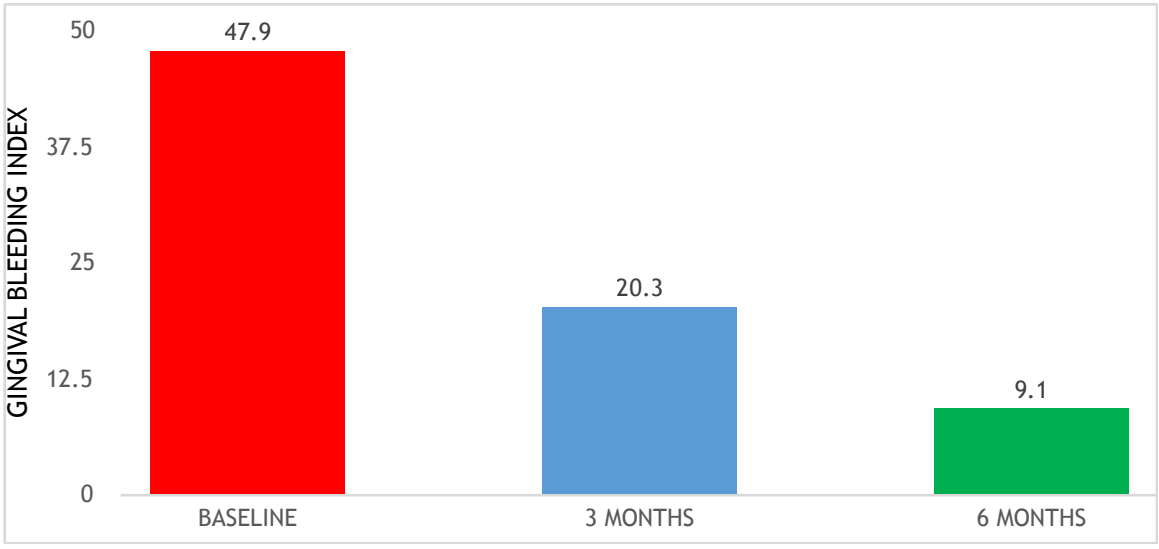


FIGURE 5 : COMPARISION OF MEAN PRIODONTAL PROBING DEPTH

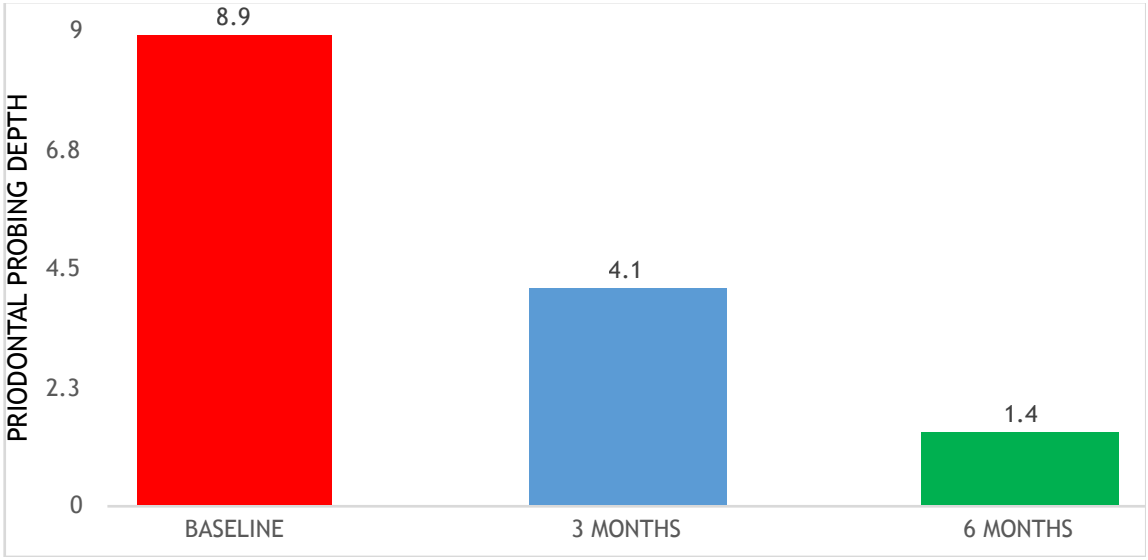


FIGURE 6 : COMPARISION OF MEAN CLINICAL ATTACHMENT LEVEL

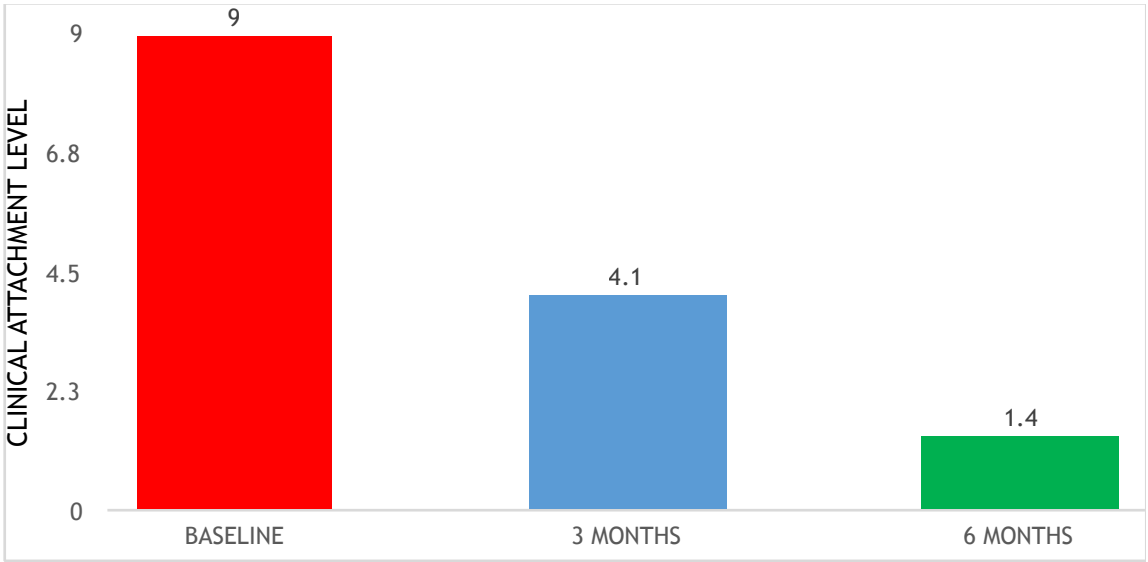


FIGURE 7 : COMPARISION OF MEAN CEJ-BD

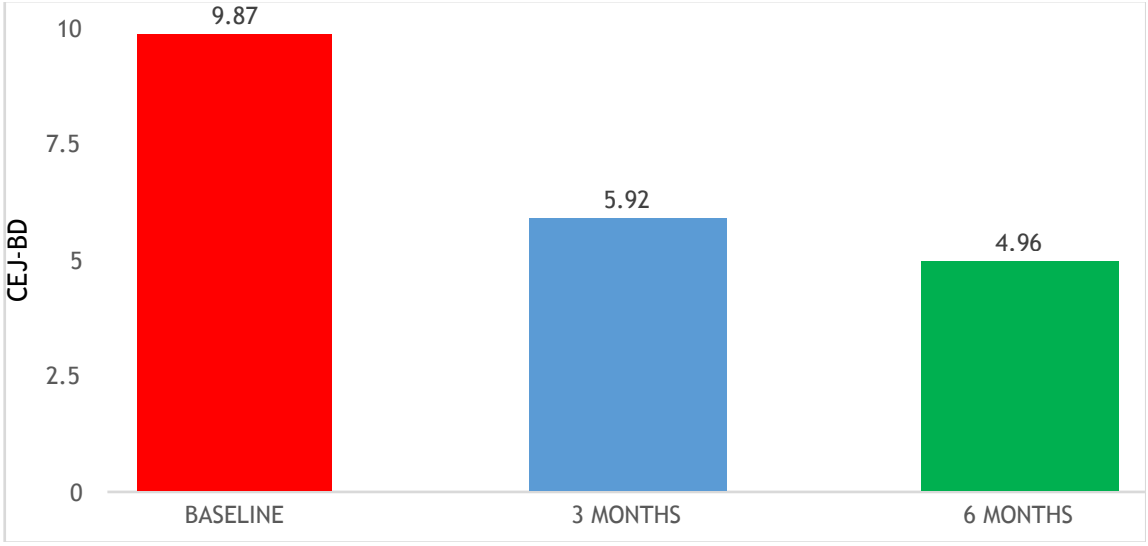


FIGURE 8 : COMPARISION OF MEAN CEJ-AC

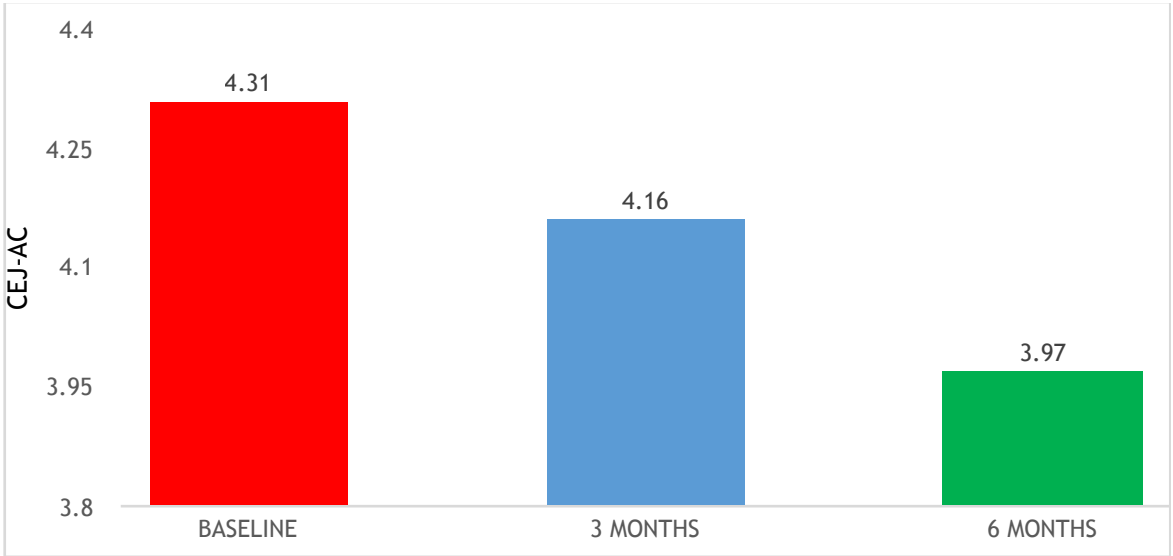


FIGURE 9 : COMPARISON BETWEEN THE MEAN VALUES OF THE DEFECT DEPTH (IOPA)

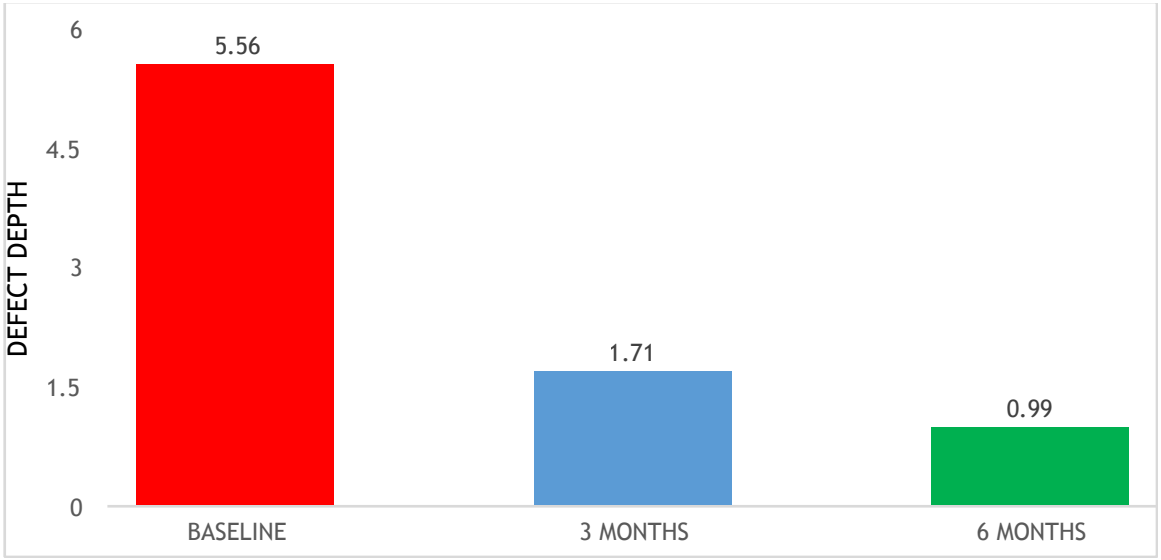


FIGURE 10 : COMPARISON BETWEEN THE MEAN VALUES OF BONE FILL in mm

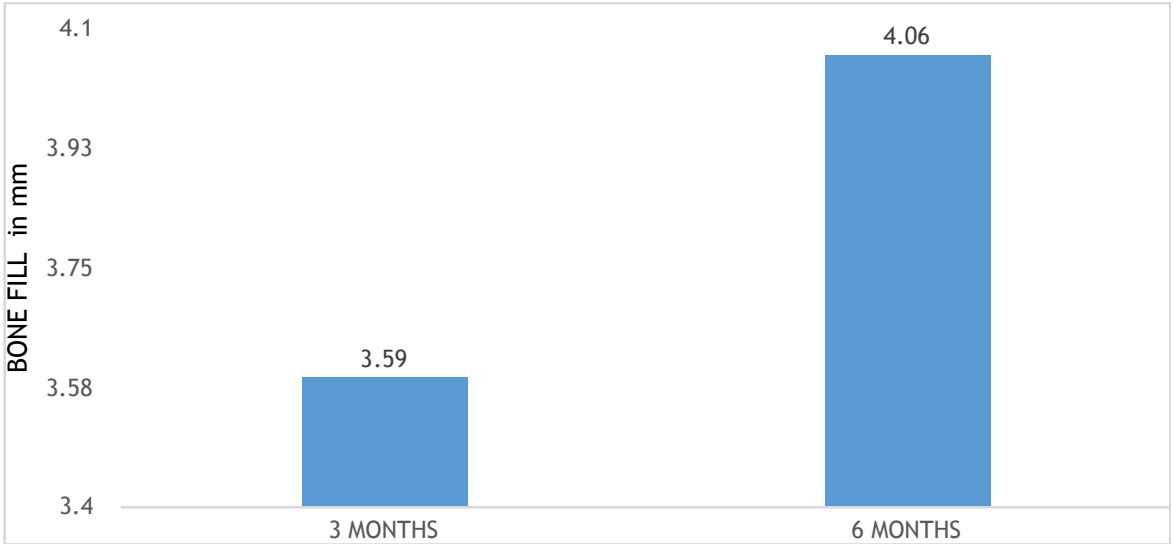


FIGURE 11: COMPARISON BETWEEN THE MEAN VALUES OF BONEFILL in %

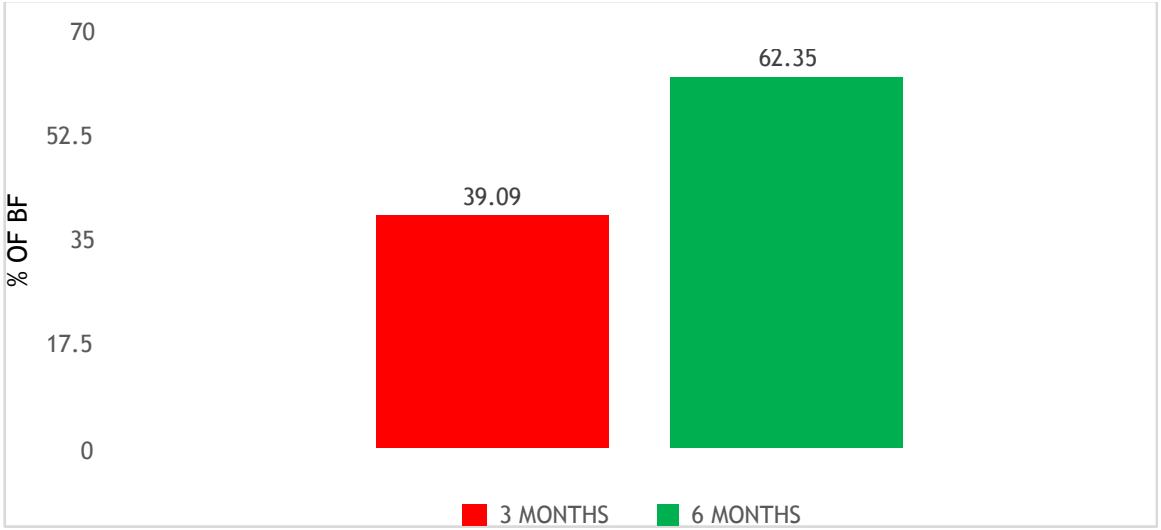


FIGURE 12: COMPARISON BETWEEN THE MEAN VALUES OF BONE CREST CHANGE in mm

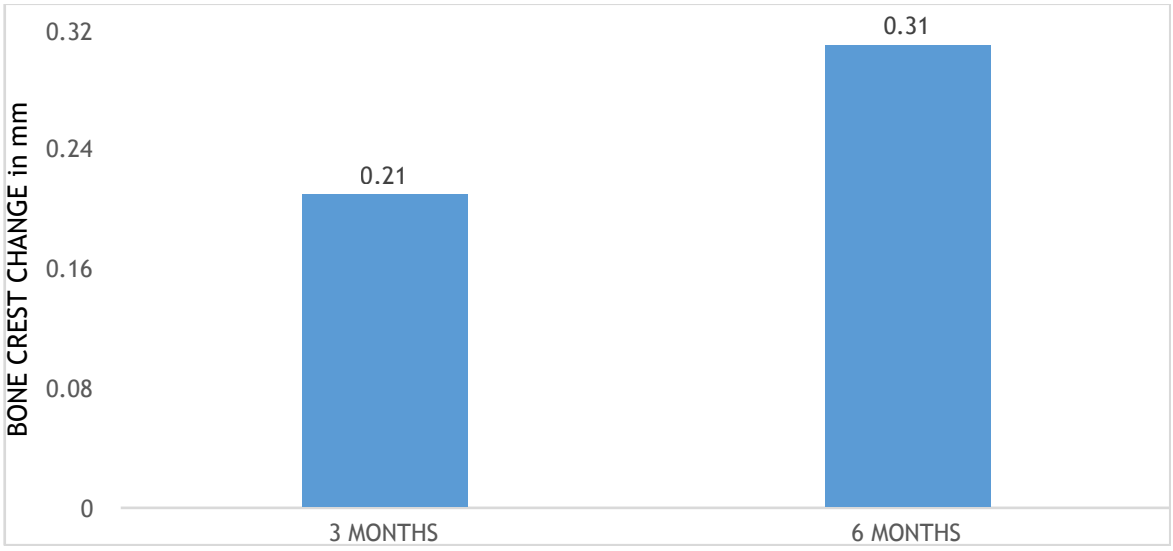


FIGURE 13: COMPARISON BETWEEN THE MEAN VALUES OF BONE CREST CHANGE in %

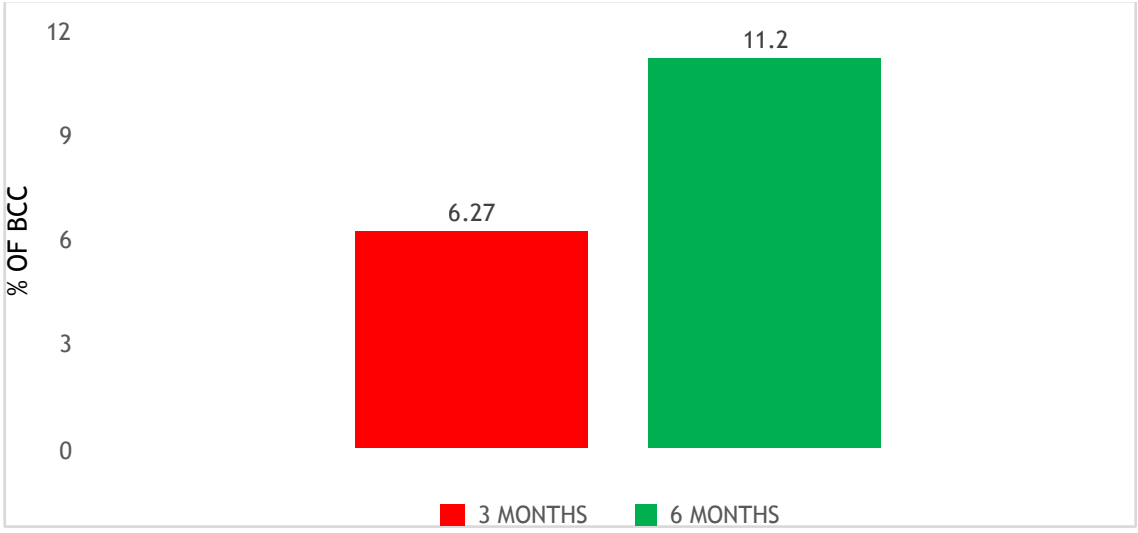


FIGURE 14: COMPARISON BETWEEN THE MEAN VALUES OF DEFECT RESOLUTION

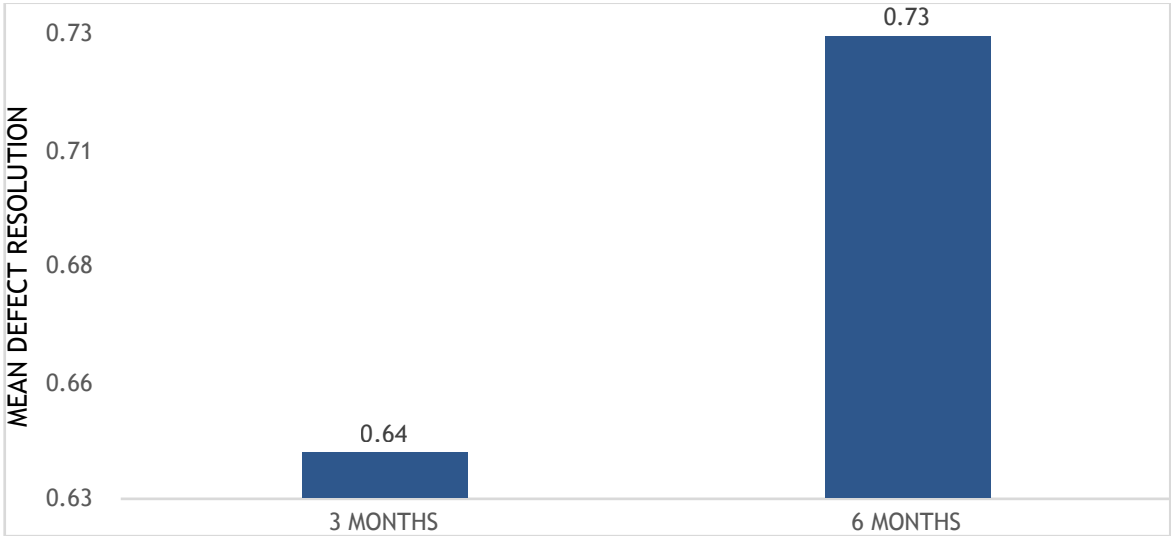
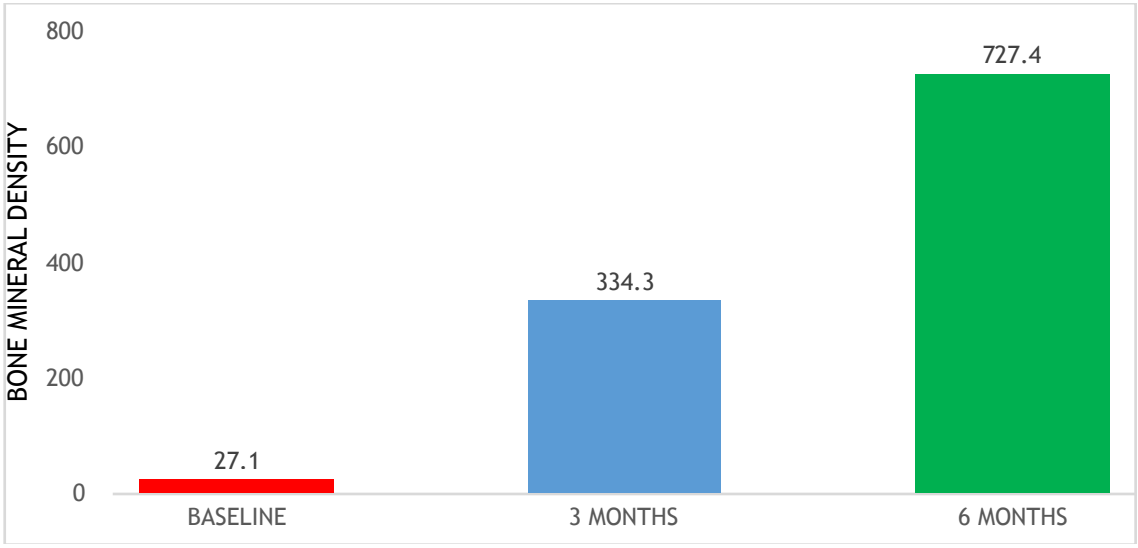


FIGURE15: COMPARISON BETWEEN THE MEAN VALUES OF THE BONE MINERAL DENSITY (CBCT)



DISCUSSION

Periodontitis is a multifactorial disease that results from a complex interplay between the subgingival biofilm and the host immuno-inflammatory process. The primary goal of periodontal treatment is the maintenance of the natural dentition in health and comfortable function. Thus the aim of periodontal therapy is to arrest and control the periodontal infection and ultimately to regenerate lost periodontal structures [76]

A multitude of new bone graft materials have been used for promoting periodontal regeneration in intrabony defects but till date no graft material has been proven as a gold standard in the treatment of intrabony defects. However in a systematic review Trombelli et al [14] have concluded that the use of specific biomaterials/bone grafts was more effective than open flap debridement in improving attachment levels in intraosseous defects.

Fresh autogenous bone graft is still considered gold standard since it exhibits bioactive cell instructive matrix properties and is non-immunogenic and non pathogenic in spite of the need for harvesting bone and possible morbidity resulting from it. All extracted teeth are considered a clinical waste and therefore are simply discarded. Recently, several studies reported that extracted teeth from patients that undergo a process of cleaning, grinding, demineralization and sterilization is a very effective graft to fill alveolar bone defects of same patient. [77,78,79]

The recent innovation in periodontal regeneration is towards the use of various commercially available poly-peptide growth factors but their use is restricted because of their limited availability and high cost. Growth factors are a class of natural biologic mediators having local and systemic effects. The autogenous demineralised

dentin graft also contains with growth factors like BMPs, fibroblast growth factor. Type I collagen includes non-collagenous proteins (NCPs), such as phosphophoryn and sialoprotein in the organic parts, which trigger bone resorption and generation processes and helps in the osteoconduction and osteoinduction .

The tooth selected for graft preparation is either impacted , non functional third molar or tooth that are periodontally week . Tooth with endodontic treatment are avoided to prevent root contamination with foreign particles.

Unlike other autogenous graft, site preperation, the process from tooth extraction until grafting takes approximately 15-20 minutes which is short period and recipient site heals by natural way.

It is obvious that the volume of the particulate dentin is more than twice of the original root volume hence it is possible to get adequate graft material from tooth . The particles less than 300 μm is considered as a non-efficient particulate size for bone grafting. And particle size more than 1200 μm has higher resorption time. Hence the particle size between 300 μm and 1200 μm was selected for the procedure.

The sterilisation of dentin graft was done by placing graft in 1N lactic acid for 15–20 min found to be efficacious . Study done on checking the efficiency of sterilisation by incubation of graft in nutrient broth for 72 hours and turbidity was absent hence confirmed the optimal microbial inhibition and unlike the other inorganic acids the residues may contact human tissue and react. Hence lactic acid was selected for sterilisation .

The present study was designed to evaluate the efficacy of autogenous dentin graft . For this purpose, a total of 10sites in 9 patients were taken up for study.

Patients from age group 20-45 years were included in the study and this was in accordance with Deas and Mealey [80] inclusion criteria.

Only 3-wall and combined intrabony defects were selected because the number of remaining bony walls were found to be correlated positively with regeneration potential in grafting procedures.[81] In addition, 3-wall defects provide the best spatial relationship for defect bridging by vascular and cellular elements from the periodontal ligament and adjacent osseous wall. [82] .

ATG resorbs within 4–6 months after grafting. The remodeling process with new bone formation continues up to 1–2 years.[83,84] Based on these references, a 6 months follow-up period was selected for the current study.

Grimard *et al*.[85] compared direct clinical, periapical radiograph, and CBCT measurement techniques for assessing bone level changes following regenerative periodontal therapy in 35 intrabony defects. Authors found that overall; CBCT was significantly more precise and accurate than periapical radiographs and concluded that CBCT may obviate surgical reentry as a technique for assessing regenerative therapy outcomes. **Akshaya et al in 2015** [86] concluded in a study that CBCT is highly accurate in identifying and quantifying periodontal bone loss for both horizontal and vertical defect and thus can be an excellent diagnostic aid for periodontal treatment planning as well as re-evaluation. Hence CBCT at region of interest was taken in our study at baseline, 3 month , 6 month post surgically.

In the year 2014 **Itzhak Binderman et al** did a longitudinal study for period of two years and during the period of two years, more than 100 procedures were performed, most of which for the purpose of preservation of alveolar bone. In those patients, implant insertion was possible as soon as 2-3 month after grafting of

autogenous dentin. On x-rays and biopsy of grafting sites a dense dentin-bone composite was found. No wound healing complications were observed ,and their conclusion was autogenous mineralized dentin particulate grafted immediately after extractions should be considered as the gold standard for socket preservation, bone augmentation in sinuses and bone defects.

Chaitanya Pradeep Joshi et al in 2015 done a comparative study and found in their comparative study that ATG-grafted sites showed the most superior results with a minimal reduction in alveolar crest height and width. Histological analysis also showed the same trend with more new bone formation at ATG-grafted sites . ATG-grafted sites consistently showed least reduction in ridge height, i.e., 0.28 ± 0.13 mm which was significantly lower as compared to β-TCP-grafted sites with 1.72 ± 0.56 mm reduction and ungrafted sites with 2.60 ± 0.88 mm reduction ($P < 0.05$). And concluded that ATG material can serve as a better alternative to conventional bone graft materials.

Various previous studies on autogenous dentin graft strongly supported the bone regenerative property . Hence the aim of this study was to find the efficacy of autogenous dentin graft in intrabony defect .

On evaluation of clinical parameters, plaque index showed similar clinical values in both groups at baseline and after 6 months, with no significant change thus suggesting good hygiene maintenance by all patients during the course of the study. The result was in accordance with the studies by **Yukna et al** [87] and **Srikanth et al**[88] who observed that patients undergoing periodontal therapy try to maintain optimal oral hygiene.

In the present study probing related clinical parameters were recorded only at baseline and 6 months postoperatively. The mean reduction in pocket depth from baseline to 6 months was 7.500 and statistically significant.

Significant gain in the clinical attachment level was noted from 9.00 ± .943 at baseline to 1.40 ± .516 at 6 months .Hence all the clinical parameters considered in this study were significant . On radiographic evaluation, significant reduction in defect depth was observed at the end of 3 months and 6 months in comparison to baseline. The mean defect depth reduced to 2.81 ± 1.76 at 6 months from 5.31 ± 0.78 at base line .

The mean percentage of bone fill obtained in the present study was 62.35 ± 15.59 for autogenous graft at the end of 6 months. These results compare favourably to those found by **Pradeep et al** [89] who observed 63.39 ± 16.52% of bone fill with another autogenous graft PRF + HA combination at the end of 9 months.

The mean percentage defect resolution at 3 months was 35.09 ± 15.88 and at 6 months was 53.85 ± 14.02. The mean difference in percentage defect resolution from 3 months to 6 months was 18.76.

The mean percentage of bone crest changes at 6 months was 11.2 ± 10.62 and at 3 months was 6.27 ± 12.01. Percentage of original defect resolution is an important parameter that takes into account not only the amount of bone fill but also the change in alveolar crest level, if any. And these factors findings were statistically significant.

The bone mineral density was calculated using the CBCT and improvement in bone mineral density was found to be significant. The baseline value was 27.10± 42.52, at 3 months was 334.30 ± 97.61and at 6 months was 727.40 ± 154.99. The mean difference in bone mineral density from baseline to 3 months and 6 months

were 307.20 and 700.30 respectively which was statistically significant (p = 0.000).

In the present study autogenous dentin graft demonstrated significant results in clinical and radiographic parameters in the management of periodontal intrabony defects. However, future long-term clinical and histological studies should be undertaken to determine the efficacy of autogenous dentin graft in the treatment of intrabony defects. Thus in future, ATG may prove to be a novel adjunct to conventional regenerative methods in management of periodontal osseous defects.

SUMMARY AND CONCLUSION

The present study was conducted in order to evaluate the efficacy of autogenous dentin graft in the treatment of intrabony defects. A total of 10 defects in nine patients were selected for the study. The clinical and radiographic data were assessed over a period of 6 months and the values were subjected to statistical analysis.

The following conclusions were drawn from the study:

- The graft material autogenous dentin graft was well tolerated by the periodontal tissues during the course of the study.
- There was a definite improvement in the clinical and radiographic parameters from baseline to 6 months.
- Radiographic evidence of defect depth reduction and defect fill was observed. The difference at the end of 3 months and 6 months was statistically significant .
- There is evidence of significant reduction in defect depth at 6 months

  The outcomes of regenerative periodontal therapy are dependent on multiple factors such as patient selection, defect selection, choice of diagnostic and therapeutic modalities and post-operative follow up period. Therefore all these factors should be taken into consideration during decision making.

Within the limits of the present study, it can be concluded that autogenous dentin graft was effective in improving the clinical as well as radiographic parameters.the autogenous dentin graft gives successful and promising results in treating intrabony defects. Thus in future, clinical trials with larger sample size may be employed to further explore the potential benefits of autogenous dentin graft as a grafting material.

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ANNEXURE-1

PARTICIPANT INFORMATION SHEET

Investigator : DR. Shyamala M

Guide : DR. P. Bhuvaneshwari , MDS

Title : **EVALUATION OF CLINICAL EFFECTIVENESS OF AUTOGENOUS DENTIN GRAFT IN PERIODONTAL INTRA BONY DEFECT –A CLINICAL AND RADIOLOGICAL STUDY**

Name of the research institution : Tamilnadu Government Dental College and Hospital, Chennai

The investigator, Dr. Shyamala M under the guidance of Dr.Bhuvaneswari ., MDS., is conducting a study as titled above with aim to do an evaluation of efficacy of autogenous dentin graft in management of intrabony defect .

Procedure : the following examinations and investigations will be done for you.

- Intraoral examination, Extraoral examination
- Blood test – 7ml of blood will be drawn from your hand
- X-ray will be taken for the diseased site with protection (lead apron , thyroid collars)
- Model of your teeth will be prepared by taking alginate impression
- Deposits on your teeth will be cleaned with ultrasonic scaler and hand instrument. Surgery will be done with placement of intended material in the diseased site
- Clinical and radiological evaluation will be performed at baseline , 3 months and 6 months after the procedure.

2. **Risk of participation:**
   - Patients may be allergic to LA or the material used in the study.
   - Patient may experience pain, discomfort, swelling following the procedure.
3. **Benefits of participation:**

   Patients will be treated for improving the periodontal status and minimizing alveolar bone loss.

4. **Confidentiality :**

The identity of the patients participating in the research will be kept confidential throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

5. **Participants right :**

Taking part in the study is voluntary. You are free to decide whether to participate in the study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled. The results of this study will be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

6. **Compensation: Nil**
7. **Contacts:**

For queries related to the study:	**Contact details regarding rights of the participant:**
Primary Investigator: Dr. Shyamala M PG Student Department of Periodontics Tamilnadu Govt. Dental College & Hospital Chennai- 600 003 Mobile - 9003183857	Dr.VIMALA , MDS,PhD, The Chairperson, Institutional Ethical committee Tamilnadu Govt. Dental College & Hospital, Chennai-600 003.

ANNEXURE 2

ஆராய்ச்சி பற்றிய தகவல் படிவம்

ஆராய்ச்சி மேற்கொள்பவர்
மரு.சியாமளா.மா
எம்.டி.எஸ்

வழிநடத்துபவர்
மரு.மகேஸ்வரி ராஜேந்திரன்,

ஆராய்ச்சி நிறுவனத்தின் பெயர் : தமிழ்நாடு அரசு பல் மருத்துவக் கல்லூரி மற்றும் மருத்துவமனை, சென்னை.

ஆராய்ச்சியின் தலைப்பு

பல் வேர் பகுதி எலும்பு தேய்மானத்தில் பல்திசு ஒட்டு பயன்படுத்தி மீளுருவாக்கம் திறன் மதிப்பீடு-ஒரு மருத்துவ ஆய்வு.

ஆராய்ச்சியின் நோக்கம்

பல்வேர் பகுதி எலும்பு தேய்மானத்தில் பல்திசு ஒட்டு பயன்படுத்தி மருத்துவ மற்றும் கதிரியக்க மதிப்பீடுகளை அறுவை சிகிச்சைக்கு முன், 3 மாதங்களுக்கு பின் மற்றும் 6 மாதங்களுக்கு பின் ஆய்வு செய்தல்.

செய்முறை

கீழ்கண்ட ஆய்வுகள் பரிசோதனைகள் உங்களுக்கு செய்யப்படும்.

- வாய் பரிசோதனை
    - உட்புடம்
    - வெளிபுறம்
- வழக்கமான இரத்தப் பரிசோதனை
- உங்களின் கைகளிலிருந்து இரத்தப் பரிசோதனைக்காக 5 மி.லி அளவு (ஒரு மேஜைக் கரண்டி அளவு) இரத்தம் எடுக்கப்படும்.
- ஒவ்வாமை ஏற்படுகிறதா என்பதை தொரிந்துகொள்ள 0.5மி.லி 2% லிக்னோகெயின் மயக்க மருந்து உங்களின் கையில் பரிசோதனைக்காக செலுத்தப்படும். பின்பு நோயுற்ற பகுதியில் மயக்க மருந்து கொடுக்கப்படும்.
- அல்ட்ரா சோனிக் ஸ்கேலர் மற்றும் கைக்கருவிகள் பயன்படுத்தி பல் மற்றும் பல்லின் வேர் சுத்தம் செய்யப்படும். உப்புநீர் கொண்டு நோயுற்ற பகுதி சுத்தம் செய்யப்படும்.
- பல்திசு ஒட்டு பல் வேர் பகுதி எலும்பு தேய்மானத்தில் பயன்படுத்தப்படும்.
- மருத்துவ மற்றும் கதிரியக்க மதிப்பீடு தொடக்க நிலையில், 3 மாதங்களுக்கு பின் மற்றும் 6 மாதங்களுக்கு பின் செய்யப்படும்.

<u>பங்கேற்பதினால் வரக்கூடிய பக்க விளைவுகள்</u>

வலி, வீக்கம் மற்றும் பயன்படுத்தும் பொருட்களினால் சில நேரங்களில் ஒவ்வாமை ஏற்பட வாய்ப்புண்டு. அதற்காக தேவைப்படும் மருந்துகளும் மருத்துவமும் வழங்கப்படும்.

<u>பங்கேற்பதினால் விளையும் நன்மைகள்</u>

உங்களின் நாள்பட்ட பல் ஈறு நோய்க்கு சிகிச்சை அளிக்கப்படும்.

<u>இரகசிய காப்பு</u>

உங்களைப் பற்றிய குறிப்புகள் பிறர் அறியா வண்ணம் ஆராய்ச்சி முடியும் வரை இரகசியமாக பாதுகாக்கப்படும். அதை வெளிப்படுத்தும் நேரங்களில் எந்த தனி அடையாளங்களும் வெளிப்பட வாய்ப்பு கிடையாது.

<u>தன்னால் பங்கேற்பு</u>

இந்த ஆராய்ச்சியில் பங்குபெறுவது தங்களின் தனிப்பட்ட முடிவு மற்றும் இந்த ஆராய்ச்சியில் இருந்து நீங்கள் எப்போது வேண்டுமானாலும் விலகிக்கொள்ளலாம். தங்களின் இந்த திடீர் முடிவு உங்களுக்கோ அல்லது ஆராய்ச்சியாளருக்கோ எந்தவித பாதிப்பும் ஏற்படுத்தாது என்பதை தெரியப்படுத்துகிறோம்.

நோயாளியின் பெயர்

கையொப்பம்/கைரேகை

ஆராய்ச்சி தொடர்புடைய தகவல்களுக்கு தொடர்புடைய
மரு.சியாமளா.மா
முதுநிலை மருத்துவர்,
தமிழ்நாடு அரசு பல் மருத்துவக் கல்லூரி நெறிமுறைகள் குழு,
மருத்துவமனை, சென்னை-3
கல்லூரி
செல் : 9500931297
சென்னை-3.

பங்கேற்பாளரின் உரிமை

தகவல்களுக்கு:
மரு.பி.சரவணன் MDS, Ph.D.,
தலைவர், நிறுவன

தமிழ்நாடு அரசு பல் மருத்துவக் கல்லூரி

மற்றும் மருத்துவமனை,

ANNEXURE-3

INFORMED CONSENT FORM

EVALUATION OF CLINICAL EFFECTIVENESS OF AUTOGENOUS DENTIN GRAFT IN PERIODONTAL INTRA BONY DEFECT –A CLINICAL AND RADIOLOGICAL STUDY

Participant ID No:

"I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this study and understand that I have the right to withdraw from the study at any time without in any way it affecting my further medical care."

_____	_____	_____
Date	Name of the participant	Signature/thumb impression Of the participant

[The literate witness selected by the participant must sign the informed consent form. The witness should not have any relationship with the research team; If the participant doesn't want to disclose his / her participation details to others, in view of respecting the wishes of the participant, he / she can be allowed to waive from the witness procedure (This is applicable to literate participant ONLY). This should be documented by the study staff by getting signature from the prospective participant]

_____

_____

"I have witnessed the accurate reading of the consent form to the potential participant and the individual has had opportunity to ask questions. I confirm that the individual has given consent freely"

_____	_____	_____
Date	Name of the witness	Signature of the witness
_____.	_____	_____
Date	Name of the interviewer	Signature of the interviewer

ANNEXURE 4

ஆராய்ச்சி ஒப்புதல் படிவம்

ஆராய்ச்சியின் தலைப்பு

பல்வேர் பகுதி எலும்பு தேய்மானத்தில் பல்திசு ஒட்டு பயன்படுத்தி மீளுருவாக்கம் திறன் மதிப்பீடு - ஒரு மருத்துவ ஆய்வு

பெயர் புறநோயாளி எண்

வயது/பால் ஆராய்ச்சி சேர்க்கை எண்

முகவரி

தொலைபேசி

நான் ..... வயது ..... என்னுடைய சுய நினைவுடனும் மற்றும் முழு சுதந்திரத்துடனும் இந்த மருத்துவ ஆராய்ச்சியில் என்னை சேர்த்துக்கொவள்ள ஒப்புதல் அளிக்கிறேன்.

கீழ்காணப்படும் நிபந்தனைகளுக்கு நான் சம்மதிக்கிறேன்.

- நான் இந்த ஆராஞ்ச்சியின் நோக்கம் மற்றும் செயல்முறைகள் பற்றி முழுமையாக தெரிவிக்கப்ப்ட்டுளேன்.
- நான் இந்த ஆய்வுக்காக ஈறு அறுவை சிகிச்சை மற்றும் எல் எடுக்கும் சிகிச்சைகளை செய்துகொள்ள வேண்டியதாக அறிகிறேன்.
- சிகிச்சையின் போது பல்திசு ஒட்டு பயன்படுத்த சம்மதிக்கிறேன்.
- என் உடல் நலம் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்கு மாறான நோய்குறிகள் தென்பட்டாலோ அதற்கு சிகிச்சை பெற்றுக் கொள்வதற்கும் முழு உரிமை உள்ளதாக அறிகிறேன்.
- நான் ஏற்கனவே உட்கொண்ட மற்றும் உட்கொள்கின்ற மருந்துகளின் விபரங்களை ஆராய்ச்சியாளர்களிடம் தெரிவித்துள்ளேன்.
- என் மருத்துவ குறிப்பேடுகளை இந்த ஆராய்ச்சியில் பயன்படுத்திக்கொள்ள சம்மதிக்கிறேன். இந்த ஆராய்ச்சி மையமும் ஆராய்ச்சியாளரும் என்னுடைய விபரங்கள் அனைத்துயும் இரகசியமாக வைப்பதாக அறிகிறேன்.

.....	.....	.....
நோயாளியின் பெயர்	கையொப்பம்	தேதி
.....	.....	.....
ஆராய்ச்சியாளர் பெயர்	கையொப்பம்	தேதி

<u>பங்கேற்பதினால் விளையும் நன்மைகள்</u>

உங்களின் நாள்பட்ட பல் ஈறு நோய்களுக்கு சிகிச்சை அளிக்கப்படும்.

<u>இரகசிய காப்பு</u>

உங்களைப் பற்றிய குறிப்புகள் பிறர் அறியா வண்ணம் ஆராய்ச்சி முடியும் வரை இரகசியமாக பாதுகாக்கப்படும். அதை வெளிப்படுத்தும் நேரங்களில் எந்த தனி அடையாளங்களும் வெளிப்பட வாய்ப்பு கிடையாது.

<u>தன்னார்வ பங்கேற்பு</u>

இந்த ஆராய்ச்சியில் பங்குபெறுவது தங்களின் தனிப்பட்ட முடிவு மற்றும் இந்த ஆராய்ச்சியில் இருந்து நீங்கள் எப்போது வேண்டுமானாலும் விலகிக்கொள்ளலாம். தங்களின் இந்த திடீர் முடிவு உங்களுக்கோ அல்லது ஆராய்ச்சியாளருக்கோ எந்த வித பாதிப்பும் ஏற்படுத்தாது என்பதை தெரியப்படுத்துகிறோம்.

நோயாளியின் பெயர்

கையொப்பம்/கைரேகை

ஆராய்ச்சி தொடர்புடைய தகவல்களுக்கு தொடர்புடைய

மரு.சியமளா.மா

முதுநிலை மருத்துவர்,

தமிழ்நாடு அரசு பல் மருத்துவக் கல்லூரி நெறிமுறைகள் குழு,

மருத்துவமனை, சென்னை-3

மருத்துவக் கல்லூரி

செல் : 9500931297

பங்கேற்பாளரின் உரிமை

தகவல்களுக்கு:

மரு.பி.சரவணன் MDS, Ph.D.,

தலைவர், நிறுவன

தமிழ்நாடு அரசு பல்

Annexure 5:

Proforma

DEPARTMENT OF PERIODONTICS

TAMILNADU GOVERNMENT DENTAL COLLEGE AND HOSPITAL.

CHENNAI – 600003

"EVALUATION OF CLINICAL EFFECTIVENESS OF AUTOGENOUS DENTIN GRAFT IN PERIODONTAL INTRA BONY DEFECT – A CLINICAL AND RADIOLOGICAL STUDY "

Date:

Name:

Address:

Chief Complaint :

History of presenting illness :

Past Medical History

Past Dental History Personal history:

1. Habits

O.P. No:

Age / Sex:

Tel no: Occupation:

Group no:

Case no:

Mobile no:

Income:

2. Oral hygiene

3. Menstrual history

Clinical Examination:

EXTRAORAL EXAMINATION:

1. Facial symmetry

2. Lymph node status

INTRA ORAL EXAMINATION:

1. Occlusion:

2. Gingival examination: colour contour Texture consistency Bleeding on probing

PERIODONTAL EXAMINATION:

exudate

position

1. PLAQUE INDEX-SILNESS&LOE (1964)

Score: Calculation:

Interpretation:

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

3. PROBING DEPTH (PD) & CLINICAL ATTACHMENT LOSS (CAL) (mm)

MAXILLARY

PALATAL

CAL																
PD																
	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
PD																
CAL																

BUCCAL

MANDIBULAR

LINGUAL

CAL																
PD																
	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
PD																
CAL																

BUCCAL

4. INVESTIGATIONS:

Blood investigations:

Radiological assessment:

Others:

5. DIAGNOSIS:

6. PROGNOSIS:

TREATMENT:

1. EMERGENCY / PRELIMINARY:

2. PHASE I:

3. RE-EVALUATION AFTER PHASE I THERAPY:

4. CLINICAL SITE SELECTED FOR STUDY:

5. PHASE II: (SURGICAL)

6. PHASE III:

7. PHASE IV :(RE-EVALUATION) CLINICAL EVALUATION:

S.No.	Indices	Baseline	6 month Post-op
1	Plaque index (Silness and Loe ,1964)		
2	Gingival bleeding index (Ainamo&Bay ,1975)		

S.No.	Calculations	Baseline	6 month Post-op
1	Pocket Probing Depth (mm)		
2	Gingival recession (mm)		
3	Clinical Attachment level (mm)		

RADIOGRAPHIC EVALUATION:

S.No.	Calculations	Baseline	Post op	
			3 months	6 months
1	CEJ to the base of the defect (mm)			
2	CEJ to the alveolar crest of the defect (mm)			

INFERENCE/RESULT:

Signature of the P.G. Student. Signature of the Guide

Date: